GROUND WATER DISCHARGE PERMIT (DP-1132)
RADIOACTIVE LIQUID WASTE TREATMENT FACILITY
LOS ALAMOS NATIONAL LABORATORY

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I. ACRONYMS:

The following acronyms and abbreviations may be used throughout this Discharge Permit:

BOD_5-biochemical oxygen demand (5-day)
CAS-Chemical Abstract Service
CFR-Code of Federal Regulations
Cl- chloride
CQCAP- Construction Quality Control Assurance Plan
DOE-United States Department of Energy
EPA- United States Environmental Protection Agency
gpd- gallons per day
LANL-Los Alamos National Laboratory
LANS- Los Alamos National Security, LLC
MES-Mechanical Evaporator System
Mg/L-milligrams per liter (or parts per million)
NMAC-New Mexico Administrative Code
NMSA-New Mexico Statues Annotated
NO_3-N-nitrate-nitrogen
NPDES-National Pollutant Discharge Elimination System
PCBs-Polychlorinated Biphenyls
QA/QC-Quality Assurance/Quality Control
RLW-Low-level radioactive waste water
RLWTF-Radioactive Liquid Waste Treatment Facility
SET-Solar Evaporative Tank System
TA-Technical Area
TDS-total dissolved solids
TKN-total Kjeldahl nitrogen
TRU-Transuranic
TSS-total suspended solids
WQA-Water Quality Act
WQCC-Water Quality Control Commission

II. DEFINITIONS:

The following is a list of definitions as they pertain specifically to this Discharge Permit:

A. Average daily flow- the rate determined by dividing the total monthly volume by the number of days for the reporting period.

B. Active portion- the portion of the Facility where treatment, storage or disposal of waste water occurs or has occurred in the past, including those portions of the Facility which are not in use and have not been closed in accordance with the conditions in this Discharge Permit.

C. Calibration– a comparison between an instrument of known magnitude or correctness (standard) and another measurement made in as similar a way as possible with a second device (test instrument).

D. Closure- to permanently discontinue the use of a unit, system, or component of the Facility (partial) or the entire Facility (final).

E. Construction Quality Control Assurance Plan- a written plan of activities necessary to ensure that construction and installation meet design criteria. A CQCAP includes practices and procedures for inspections, testing and evaluations of material and workmanship necessary to verify the quality of the constructed unit or system, and corrective actions to be implemented when necessary.

F. Consent Order- March 1, 2005 Compliance Order on Consent agreed to by NMED, DOE, and the Regents of the University of California (predecessor to LANS) or subsequent versions.

G. Discharge- the intentional or unintentional release of an effluent or leachate which has the potential to move directly or indirectly into ground water or be detrimental to human health, animal or plant life, or property, or unreasonably interfere with the public welfare or the use of property.

H. Effluent- a liquid waste product resulting from the treatment or partial treatment of an influent waste stream intended to be discharged.

I. Exfiltration- the uncontrolled passage or penetration of waste water or sludge from a structural component of a unit or system through defective pipes, pipe joints, connections, cracks, structural failure, or material incompatibility and enters the surrounding environment.

J. Flow meter- a quantitative instrument or device that measures, displays, and records the flow of a fluid in a conduit or an open channel.

K. Freeboard-the vertical distance between the crest of the embankment and the carrying capacity level of an open tank, impoundment, or other open unit that contains a liquid or semi-liquid

L. Impoundment- a unit which is a natural topographic depression, man-made excavation, or diked area primarily constructed of earthen or other materials, specifically designed to hold, evaporate or store, an accumulation of liquid or semi-liquid waste.

M. Industrial waste water- the liquid wastes from industrial processes or non-household waste water which is generated through activity not solely derived from human excreta, residential sinks, showers, baths, clothes and dish-washing machines; or exceeds the characteristics of a domestic waste as defined in 20.7.3.7.D(6) NMAC; 300 mg/L BOD, 300 mg/L TSS, 80 mg/L total nitrogen or 105 mg/L fats, oils and grease.

N. Infiltration- the uncontrolled passage or penetration of liquids or semi-liquids into a unit or system through defective pipes, pipe joints or connections, or manhole walls.

cracks, structural failure, or material incompatibility.

O. Influent collection system- the infrastructure and associated components (e.g. sumps, pumps) used for the collection and conveyance of waste water from the originator to the Facility's treatment systems.

P. Influent- untreated water, waste water or other liquid or semi-liquid flowing into a reservoir, basin, or treatment plant.

Q. Incident Command System (ICS)– A standardized approach to the command, control, and coordination of emergency response providing a common hierarchy within which responders from multiple agencies can be effective.

R. Leak detection system- a system capable of detecting the failure of either the primary or secondary containment structure or the presence or release of an accumulated liquid in the secondary containment structure. The system must employ operational controls or consist of an interstitial monitoring device designed to detect continuously and automatically the failure of the primary or secondary containment structure or the presence of a release into the secondary containment structure.

S. Maintenance and repair- all actions associated with keeping a system or component functioning as designed or restoring a system or component to its intended function. Maintenance and repair does not include alterations to a unit or system which change the intended function or design of the unit or alter the treatment process.

T. Maximum daily discharge- the total daily volume of waste water (expressed in gallons per day) authorized for discharge by a discharge permit.

U. Open unit or system- a unit or system designed to store, treat or dispose of liquids, semi-liquids or solids in which the uppermost portion of the unit is exposed.

V. Outfall- the point where a treated waste water discharges to waters of the United States, or a tributary to waters of the United States.

W. Peak instantaneous flow- the highest design flow rate for a unit or system, expressed in gallons per minute or cubic feet per second.

X. Record drawings- the official record of the actual as-built conditions of the completed construction, to be held as the permanent record of each unit and system, which shall comply with the New Mexico Engineering and Surveying Practice Act (Chapter 61, Article 23 NMSA 1978).

Y. Secondary containment- a constructed unit or system designed to prevent any migration of waste streams or accumulated liquid out of the unit or system to the soil, ground water, or surface water at any time. Secondary containment can include, but is not limited to: double-walled pipes, concrete and floors equipped with sumps and alarm systems to detect potential leaks and must be:

- Designed, constructed and maintained to surround the unit on sides and bottom;
- Free of cracks, gaps, or fissures;
- Constructed of, or lined with, materials that are compatible with the waste streams to be in contact with the unit or system;
- Placed on a foundation or base capable of withstanding pressure gradients, settling or uplift which may cause failure of the unit or system; and
- Equipped with a leak detection system that is designed and operated so that it will detect the failure of the primary containment structure;

Z. Settled solids measurement device- an apparatus for testing settled solids in a liquid suspension for settling rate, compaction of the settled solids, and the resulting clarity

of the liquid, or thickness of solids accumulated in an impoundment or tank.

AA. Sludge or settled solids- a solid or semisolid residue that results from the treatment or precipitation of solids from a waste stream, or the accumulation of natural sediment and debris settling in an open unit or system.

BB. Synthetic Liner- a continuous layer of man-made materials which restricts the downward or lateral escape of effluent or leachate.

CC. Tank- a stationary device, designed to contain an accumulation of waste water which is constructed primarily of non-earthen materials (e.g., concrete, steel, plastic) which provide structural support. Tanks can be further identified as either an **On ground tank** meaning a tank that is situated in such a way that the bottom of the tank is on the same level as the adjacent surrounding surface allowing for visual inspection of the vertical walls but not the external tank bottom, an **In-ground tank** meaning a tank constructed or installed so that a portion of the tank wall is situated to any degree within the ground, thereby preventing visual inspection of that portion of the external surface area, or an **Aboveground tank** meaning a tank that is completely elevated above the adjacent surrounding surface allowing for visual inspection of the vertical walls and external tank bottom.

DD. Total Nitrogen- The sum of total Kjeldahl nitrogen (TKN) and nitrate-nitrogen (NO_3-N).

EE. Toxic Pollutant- a water contaminant or combination of water contaminants in concentration(s) which, upon exposure, ingestion, or assimilation either directly from the environment or indirectly by ingestion through food chains, will unreasonably threaten to injure human health, or the health of animals or plants which are commonly hatched, bred, cultivated or protected for use by man for food or economic benefit; as used in this definition injuries to health include death, histopathologic change, clinical symptoms of disease, behavioral abnormalities, genetic mutation, physiological malfunctions or physical deformations in such organisms or their offspring; in order to be considered a toxic pollutant a contaminant must be one or a combination of the potential toxic pollutants identified in the list in 20.6.2.7.WW NMAC and be at a concentration shown by scientific information currently available to the public to have potential for causing one or more of the effects listed above; any water contaminant or combination of the water contaminants identified in the list in 20.6.2.7.WW NMAC creating a lifetime risk of more than one cancer per 100,000 exposed persons is a toxic pollutant.

FF. Treatment- any method, technique or process that, through chemical biological and mechanical processes, modify waste water characteristics with the objective to neutralize and reduce or remove organic and inorganic water contaminants which if released to the environment could potentially impact ground water quality or pose a threat to human health.

GG. Unauthorized Release or spill- the intentional or unintentional spilling, leaking, pumping, pouring, emitting, emptying, or dumping of oil or other water contaminant not authorized in this Discharge Permit.

HH. Water Contaminant - any substance that could alter if discharged or spilled the physical, chemical, biological or radiological qualities of water; "water contaminant" does not mean source, special nuclear or by-product material as defined by the Atomic Energy Act of 1954.

III. Introduction

The New Mexico Environment Department (NMED) issues this Discharge Permit (Discharge Permit), DP-1132, to the United States Department of Energy (DOE) and to Los Alamos National Security, LLC (LANS) (collectively the Permittees) pursuant to the New Mexico Water Quality Act (WQA), NMSA 1978, §§ 74-6-1 through 74-6-17, and the New Mexico Water Quality Control Commission (WQCC) Regulations, 20.6.2 NMAC.

NMED's purpose in issuing this Discharge Permit, and in imposing the requirements and conditions specified herein, is to control the discharge, and potential release, of water contaminants from the Los Alamos National Laboratory (LANL) Radioactive Liquid Waste Treatment Facility (Facility) so as to protect public health, ground water for present and potential future use as a domestic water supply or an agricultural water supply, and those segments of surface water gaining from ground water inflow. In issuing this Discharge Permit, NMED has determined that the requirements of 20.6.2.3109.C NMAC have been or will be met.

The application (i.e., discharge plan) consists of the materials submitted by the Permittees on August 19, 1996, an updated application submitted to NMED on February 16, 2012, an amendment to the application submitted to NMED on August 10, 2012, supplemental information submitted on June 6, 2016, and materials contained in the administrative record prior to issuance of this Discharge Permit.

The Facility is located within Los Alamos National Laboratory, approximately 1.5 miles south of Los Alamos, New Mexico, in Sections 16, 17, 20, 21 and 22, Township 19N, Range 06E, Los Alamos County. Ground water most likely to be affected ranges from depths of approximately one foot to 1,306 feet and has a total dissolved solids concentration ranging from approximately 162 to 255 milligrams per liter.

The Facility, as it pertains to conditions within this Discharge Permit (DP-1132), is a wastewater treatment facility that is authorized to discharge up to 40,000 gallons per day (gpd), specifically described in section V(D) of this Discharge Permit and includes: the influent collection and storage system including the Waste Management Risk Mitigation Facility (WMRM); the low-level radioactive liquid waste treatment system; the transuranic waste water treatment system; the secondary treatment system; the Mechanical Evaporator System (MES); the Solar Evaporative Tank (SET) impoundment; and an outfall (Outfall 051) regulated by a National Pollutant Discharge Elimination System (NPDES) permit issued by the United States Environmental Protection Agency (EPA) pursuant to the federal Clean Water Act Section 402, 33 U.S.C § 1342. The discharge may contain water contaminants with concentrations above the standards of 20.6.2.3103 NMAC and may contain toxic pollutants as defined in 20.6.2.7.WW NMAC.

Pursuant to 20.6.2.3109 NMAC, NMED reserves the right to require a Discharge Permit Modification in the event NMED determines that the requirements of 20.6.2 NMAC are being or may be violated or that the standards of 20.6.2.3103 NMAC are being or may be violated or a toxic pollutant as defined in 20.6.2.7.WW NMAC is present. Such modifications may include, without limitation, the implementation of structural controls, treatment processes, monitoring criteria, operational processes, changes in discharge activities and the abatement of water pollution and remediation of ground water quality.

Issuance of this Discharge Permit does not relieve the Permittees of the responsibility to comply with the WQA, WQCC Regulations, and all other applicable federal, state, and local laws and regulations.

IV. Findings

In issuing this Discharge Permit, NMED finds:

A. The Permittees are discharging effluent or leachate from the Facility so that such effluent or leachate may move directly or indirectly into ground water within the meaning of 20.6.2.3104 NMAC.

B. The Permittees are discharging effluent or leachate from the Facility so that such effluent or leachate may move into ground water of the State of New Mexico which has an existing concentration of 10,000 mg/L or less of total dissolved solids (TDS) within the meaning of 20.6.2.3101.A NMAC.

C. The discharge from the Facility is within or into a place of withdrawal of ground water for present or reasonably foreseeable future use within the meaning of the WQA, NMSA 1978, § 74-6-5.E.3, and the WQCC Regulations at 20.6.2.3103 NMAC

D. The discharge from the Facility to Outfall 051 is subject to the exemption set forth in 20.6.2.3105.F NMAC, to the extent that effective and enforceable effluent limitations (not including monitoring requirements) are imposed, unless the NMED Secretary determines that a hazard to public health may result.

V. Authorization to Discharge

A. Pursuant to 20.6.2.3104 NMAC, it is the responsibility of the Permittees to ensure that discharges authorized by this Discharge Permit are consistent with the terms and conditions herein.

B. The Permittees are authorized to discharge up to 40,000 gpd of low-level and transuranic radioactive industrial waste water using a series of treatment processes as described in Section V(D) of this Discharge Permit in accordance with the Conditions set forth in Section VI of this Discharge Permit.

C. The Permittees are authorized to discharge up to 40,000 gpd of treated waste water, in accordance with the Conditions set forth in Section VI of this Discharge Permit. Discharges shall be to either the Mechanical Evaporator System (MES), the synthetically lined Solar Evaporative Tank System (SET), or through an outfall

(identified as Outfall 051) also regulated by a National Pollutant Discharge Elimination System (NPDES) permit (Permit No. NM0028355) issued by the United States Environmental Protection Agency [20.6.2.3104 NMAC, 20.6.2.3106.C NMAC, 20.6.2.3109.C NMAC].

D. The Permittees are authorized to use the following defined systems with their associated units for the process of collecting, treating, and disposing of waste water:

The Influent Collection System is defined herein as all primary and secondary containment lines that convey transuranic or low-level radioactive waste water from Technical Areas TA-03, TA-35, TA-48, TA-50, TA-55, and TA-59 to the Transuranic Waste (TRU) treatment system and the Low-level Radioactive waste water (RLW) treatment system at TA-50. It includes the conveyance lines beginning at the point the pipe emerges from the building or other structure that comprises the site of generation, and extending to the vault immediately upstream of the influent tanks at TA-50. It also includes the conveyance of low-level radioactive waste water to the RLW treatment system by truck.

The Waste Mitigation Risk Management (WMRM) Facility (Building 50-250) is located about 50 meters southeast of Building 50-01. WMRM houses six tanks, with a capacity of 50,000 gallons each, for the storage of low-level RLW influent. Four of these tanks will be held in reserve for use in emergency situations; two will be used for day-to-day influent collection and storage. Tanks are located in the basement of WMRM; the basement further serves as secondary containment for the facility.

The Low-level Radioactive Waste Water (RLW) Treatment System is defined herein as the low-level radioactive waste water influent storage tanks, the associated treatment units (filters, feed tanks, ion exchange columns, reverse osmosis units, etc.) effluent storage tanks, and other associated low-level radioactive waste water components at TA-50 and subsequent replacement facilities utilizing the same treatment processes located within the physical confines of TA-50. The process by which the individual treatment units within the low-level radioactive treatment system are utilized may, for attaining compliance with the effluent limits set forth in this Discharge Permit, be altered, by-passed, replaced, or removed in accordance with the Conditions set forth in this Discharge Permit. The physical location of each unit and system and replacement systems that convey, store, or treat RLW waste streams coming into the low-level radioactive waste water treatment system is within TA-50.

The Transuranic (TRU) Waste Water Treatment System is defined herein as the influent storage tanks for each form of TRU (acidic and caustic) waste streams, the associated neutralization unit, pressure filters, the final processing tanks, and other associated TRU waste stream conveyance, storage and treatment components at TA-50. Sludge associated with TRU shall be disposed of at an off-site facility permitted to receive TRU waste.

The Secondary Treatment System is defined herein as the receiving tanks for reverse osmosis concentrate waste water generated through the RLW Treatment System and treated effluent generated from the TRU Treatment System, the treatment process units for secondary reverse osmosis, the rotary vacuum filter, and other

associated post-treatment conveyance, storage and treatment components at TA-50 designed to reduce waste stream volumes.

The Mechanical Evaporator System (MES) is defined herein as TA-50-0257 and the units in which treated RLW effluent is disposed of through natural gas generated mechanical evaporation.

The Solar Evaporative Tank System (SET) is defined herein as the concrete impoundment at TA-52 that receives treated effluent from the RLWTF for disposal by evaporation, and the conveyance line from TA-50. The SET consists of two cells separated by a single partitioned wall; each cell has a containerized volume of approximately 380,000 gallons. The SET is an unsealed subgrade concrete structure with a double-lined synthetic liner, and a leak detection system between the synthetic liners.

Outfall 051 is defined herein as the outfall through which treated waste water from the Facility is discharged to Effluent Canyon, which is a tributary to Mortandad Canyon.

[20.6.2.3104 NMAC, 20.6.2.3106.C NMAC, 20.6.2.3109.C NMAC].

VI. Conditions

NMED issues this Discharge Permit for the discharge of water contaminants subject to the following conditions:

A. Operational Plan

1. **ANNUAL UPDATE-**The Permittees shall submit to NMED an updated Facility Process Description annually by February 1 of each year in conjunction with the February Quarterly Report. The annual Facility Process Description shall include the following:
   a. A schematic of all major structures associated with the Facility, including all influent lines, buildings, exterior tanks, effluent lines, outfall and discharge locations identified in this Discharge Permit.
   b. A comprehensive flow chart demonstrating the most current processes in operation for the collection, treatment and disposal of waste water for the Facility. The flow chart shall indicate any processes which have been by-passed, decommissioned, or are no longer used for the collection, treatment or final disposal of the waste water.
   c. An associated narrative describing each of the systems and treatment units outlined in the flow chart. This narrative shall include the collection system, primary treatment units, secondary treatment units and any systems used in the disposition of any associated waste streams at the Facility. For each unit or system, the narrative shall include:
      1) The identification of the unit or system.
      2) The physical location.
      3) Intended function.
      4) Physical description.
      5) Operational capacity, if applicable.
      6) The date the unit or system was placed in operation.

7) Origin of waste streams that the unit or system receives.
8) The unit or system(s) to which it discharges.

d. The Annual Update shall also include the following documents to be submitted annually by February 1 of each year.

1) Summary of maintenance and repairs made during the reporting period.
2) Water Tightness Testing results (VI.A.8).
3) Settled Solids measurements (VI.A.10).
4) Ground Water Flow report (VI.A.32).

[20.6.2.3106.C NMAC]

2. **NOTIFICATION OF CHANGES-**The Permittees shall submit to NMED a written notification of any changes in the Facility's collection, treatment or disposal systems which are not maintenance and repair (as defined in this permit Section II), and which are not modifications (as defined in Condition VI.A.3, Plans and Specifications). The notification shall be submitted no less than thirty days prior to the date proposed for implementation. The notification shall include, at a minimum, the following items listed herein and others which may be determined to be required by NMED.

a. Date process change is planned to be implemented.
b. Narrative of process change.
c. Justification for making the process change.
d. Units or components being removed from the process.
e. Units or components being incorporated into the process.
f. Operational controls implemented for the change in processes.
g. Intended duration of process change (e.g., permanent or limited duration).

LANL shall submit to NMED and add to the posting required in Condition VI.E.49 (Electronic Posting) any follow-up material required later by NMED, after NMED's review of a notification.
[20.6.2.3106.C NMAC]

3. **SUBMITTAL OF PLANS AND SPECIFICATIONS-**The Permittees shall not implement any expansion, process modification, or alteration of a system or unit that could constitute a discharge permit modification (as defined in 20.6.2.7.P NMAC) of the intended function, design or capacity for any of the systems, units or components of the Facility's collection, treatment or disposal systems without prior written approval by NMED. Prior to implementing any such changes, the Permittees shall submit to NMED for approval a written proposal, including plans and specifications that describes in detail the proposed changes in the processes or components of the Facility's collection, treatment, or disposal systems. The proposal shall be delivered by certified mail or hand delivery. The Permittees shall not place any waste in a new or changed unit or system unless the Permittees receive prior written approval from NMED. NMED will provide such approval only if it finds that the Permittees have submitted the required elements listed herein in sufficient detail to demonstrate

that the unit or system is designed and constructed to minimize the possibility of an unauthorized release of water contaminants which could directly or indirectly impact ground water quality or pose a threat to human health. If NMED determines that the proposed changes require an amendment or modification of this Discharge Permit, NMED will so inform, in writing, Permittees.

The proposal shall include, at a minimum, the following information.

a. Identification of all applicable units and a description of how they will be constructed.
b. A map, to scale, of the Facility, with the location of the proposed unit relative to other identified structures or systems referenced in this Discharge Permit.
c. Specifications for all new unit and system components (e.g., lift stations, valves, transfer lines, process units); whether new, retrofitted, or proposed for abandonment. All new system components for the collection, treatment or disposal of waste water at the Facility shall be designed to meet the projected needs of the Facility.
d. Plans and specifications for proposed flow meters that will be used to measure the volume of waste water discharged to or from the unit or system.
e. Demonstration that the proposed unit or system is adequately designed for its intended function.
f. Compatibility of the unit or system's constructed material with the proposed waste stream, including, if applicable, information regarding corrosion protection to ensure that it will maintain its structural integrity and not collapse, rupture or fail.
g. Certification that the foundation, structural support, seams, connections, and pressure controls, if applicable, are adequately designed and the unit or system has sufficient structural strength to convey, store, treat or dispose of the intended waste stream.
h. Certification for all plans and specifications attesting to the capacity of the unit or system including, without limitation, waste water flow data derived using both average daily flow and peak instantaneous flow. Computations should be presented in a tabular form showing depths and velocities at minimum, design average, and peak instantaneous flow for all new system components.
i. Water balance calculations for the capacity and evaporative potential for units which are subject to exposure to the environment and to which precipitation events may impact total capacity of the unit. The unit shall be designed such that two feet of freeboard or an NMED approved alternative is maintained at all times.
j. Design specifications for secondary containment for all units or systems intended to convey, store, treat, or dispose of liquid or semi-liquid waste streams.
k. Design specifications for leak detection systems associated with systems designed to convey, store, treat, or dispose of liquid or semi-liquid waste

streams, which demonstrate the capability of detecting the failure of either primary or secondary containment or the presence of any release of any accumulated liquid in the secondary containment system within the earliest practicable time as approved in advance by NMED;

l. Proposed leakage tests shall be specified for all new unit or system components with direct contact to treated or untreated waste water. This may include appropriate water or low pressure air testing. The use of a camera or other visual methods used for documentation of the inspection, prior to placing the unit or system in service is recommended.
m. Design specifications for all units or systems designed to convey, store, treat, or dispose of liquid or semi-liquid waste streams, which demonstrate the ability to remove liquids and semi-liquids from the area of containment within the earliest practicable time as approved in advance by NMED.
n. A Construction Quality Control Assurance Plan (CQCAP) assuring that the proposed unit or system will meet or exceed all design criteria and specifications.

Plans and specifications shall comply with the New Mexico Engineering and Surveying Practice Act (Chapter 61, Article 23 NMSA 1978) as well as applicable DOE and LANL Engineering Standards.
[20.6.2.1202 NMAC, 20.6.2.3106.C NMAC, 20.6.2.3109.C NMAC, NMSA 1978, §§ 61-23-1 through 61-23-32]

4. **CONSTRUCTION REPORT**-Within 90 days following completion of construction for a unit or system that requires NMED approval, the Permittees shall prepare a final construction report that contains the following items.
   a. A complete copy of record drawings, specifications, final design calculations, addenda, and change orders, as applicable, or in the alternative, a list and description of any substantive changes to design plans and specification made during construction (based on field concerns and changes).
   b. Description of the procedures and results from all inspection and tests that occur before, during, and after construction to ensure that the construction materials and the installed unit or system components meet the design specifications.
   c. A complete copy of the Operation and Maintenance Manual, specific to the unit or system being constructed.

   [20.6.2.1202 NMAC, 20.6.2.3109.C NMAC, 20.6.2.3106.C NMAC, 20.6.2.3107.C NMAC, NMSA 1978, §§ 61-23-1 through 61-23-32]

5. **RESTRICTING ENTRY**-The Permittees shall, at all times, prevent the unauthorized entry of persons, wildlife, or livestock into the active portions of this Facility (with the exception of Outfall 051) so that physical contact with the waste streams, structures and equipment is restricted. Means to control unauthorized access shall include an artificial or natural barrier which completely surrounds the active portions of the Facility and a means to control

entry, at all times, through gates or other entrances to the active portions of the Facility (e.g., locks, surveillance system).
[20.6.2.3109.C NMAC]

6. **SIGNS-**The permittees shall post bilingual warning signs (in English and Spanish) at all gates and perimeter fences, where present, around the Facility. Signs shall be posted in sufficient numbers to be visible at all angles of approach as well as from a distance of at least 25 feet, Permittees shall include on the signs the following or an equivalent warning: DANGER – UNAUTHORZED PERSONNEL KEEP OUT (PELIGRO – SE PROHIBE LA ENTRADA A PERSONAS NO AUTORIZADAS).
[20.6.2.3109.C NMAC]

7. **VERIFICATION OF SECONDARY CONTAINMENT-**Within 90 days following the effective date of this Discharge Permit (by **Due Date**), the Permittees shall submit to NMED verification demonstrating all units and systems intended to convey, store, treat or dispose of an untreated liquid or semi-liquid waste streams meet the requirements of secondary containment as defined in this Discharge Permit. Verification must also include certification of an operational leak detection system for the unit or system.
[20.6.2.3106.C NMAC, 20.6.2.3107.A NMAC, 20.6.2.3109.C NMAC]

8. **WATER TIGHTNESS TESTING-**Within 180 days following the effective date of this Discharge Permit (by **Due Date**), and every 540 days thereafter, the Permittees shall demonstrate that each unit and system intended to convey, store, treat or dispose of a liquid or semi-liquid waste stream without secondary containment is not leaking and is otherwise fit for use. To make the demonstration, the Permittees shall conduct both a visual test, for those units and systems that are above-ground and visually inspectable, and a quantifiable test, as applicable.

   For units and systems that are above-ground and visually inspectable, the visual assessment shall be adequate to detect obvious cracks, leaks, and corrosion or erosion that may lead to cracks and leaks. If necessary, the Permittees shall remove the stored waste from the unit or system to allow the condition of internal surfaces to be assessed.

   The quantifiable assessment for units and systems that are used to store, treat or dispose of liquid or semi-liquid waste streams shall consist of obtaining tank level measurements over at least a 36 hour period during which no liquid or semi-liquid is added to or removed from the unit. The exfiltration or infiltration rate shall not exceed 0.07 gallons per hour per thousand gallons of capacity for the unit or system.

   The quantifiable assessment for units and systems designed to convey a liquid or semi-liquid waste stream shall be determined through passive testing for

leakage exfiltration and infiltration. The infiltration or exfiltration rate shall not exceed 50 gallons per mile per consecutive 24 hour period for any section of the system. Infiltration and exfiltration tests for conveyance lines shall be conducted as follows:

a. Prior to testing for infiltration, the conveyance lines shall be isolated and evacuated so that maximum infiltration conditions exist at the time of testing. The Permittees shall measure and document the volume of infiltration entering each section of the conveyance line being tested. The cumulative results for the entire collection system shall not be a satisfactory method for gauging infiltration compliance.

b. Prior to testing for exfiltration, the conveyance lines shall be isolated and filled with water to a level that produces, at minimum, two feet of hydrologic head above the uppermost point of the section being tested. The cumulative results for the entire collection system shall not be a satisfactory method for gauging exfiltration compliance.

Demonstration of water tightness shall comply with the New Mexico Engineering and Surveying Practice Act (Chapter 61, Article 23 NMSA 1978). The Permittees shall submit to NMED the procedures and findings of the evaluation in the Annual Update (Condition VI.A.1, Annual Update) by February 1 of each year immediately following the date when the water tightness test was performed. In the event that inspection reveals that the leakage rate is greater than permissible in this Discharge Permit, the Permittees shall implement the requirements of Condition V.I.A.9 (Actual or Potential Water-Tightness Failure) in this Discharge Permit.
[20.6.2.3106.C NMAC, 20.6.2.3107.A NMAC, 20.6.2.3109.C NMAC]

9. ACTUAL OR POTENTIAL WATER-TIGHTNESS FAILURE-In the event that any unit or system does not demonstrate water-tightness in accordance with this Discharge Permit or should inspection reveal damage to the unit that could result in structural failure, the Permittees shall take the following actions.

a. If the unit or system failure resulted in an unauthorized release the Permittees shall provide NMED oral notification of the release in 20.6.2.1203 NMAC within 24 hours of learning of the release and take the following corrective actions.
   1) The Permittees shall remove the unit or system from service immediately; and
   2) As soon as possible following the failure of the unit or system, but within 30 days of the failure, the Permittees shall submit to NMED for approval a written proposal including a schedule for corrective actions to be taken to repair or permanently cease operation of the unit or system.

If repair or replacement of a unit or system requires construction, the Permittees

shall submit plans and specifications to NMED with the proposed corrective actions. Plans and specifications shall comply with the New Mexico Engineering and Surveying Practice Act (Chapter 61, Article 23 NMSA 1978).

Upon NMED approval, the Permittees shall implement the approved corrective actions according to the approved schedule.

Prior to placing a repaired or replaced unit or system back into service, the Permittee shall repeat the water-tightness testing in accordance with Condition VI.A.8 (Water Tightness Testing) to verify the effectiveness of the repair or replacement, and submit a report detailing the completion of the corrective actions to NMED. The report shall include the date of the test, the name of the individual that performed the test, written findings, photographic documentation of the unit's interior and water tightness test results. If notified to do so by NMED, the Permittees shall also submit record drawings that include the final, construction details of the unit. Record drawings shall comply with the New Mexico Engineering and Surveying Practice Act (Chapter 61, Article 23 NMSA 1978).
[NMSA 1978, § 74-6-5.D, 20.6.2.3107.A NMAC, 20.6.2.3109.B NMAC]

10. **SETTLED SOLIDS; SETTLED SOLIDS REMOVAL**-The Permittees shall inspect and measure the thickness of the settled solids in the SET on an annual basis. The Permittees shall measure the thickness of settled solids in accordance with the following procedure.
    a. The total surface area of each basin shall be divided into nine equally sized areas.
    b. A settled solids measurement device shall be utilized to obtain one settled solids thickness measurement (to the nearest half foot) within each area.
    c. The individual settled solids thickness for each of the nine measurement areas shall be averaged.

    The Permittees shall record all measurements in an inspection log which must include, at a minimum, the following.
    a. Date and time of the inspection.
    b. The name of the inspector.
    c. Identification of the unit.
    d. The location of the unit.
    e. The estimated total volume of liquid or semi-liquid in the unit or system at the time of inspection.
    f. The total depth capacity of the unit or system (allowing for freeboard requirements).
    g. The method used to determine the settled solids thickness.
    h. The average measured thickness of settled solids in the unit.

    The Permittees shall not allow settled solids to accumulate in any open unit or system used to convey, store, treat, or dispose of liquid or semi-liquid at an

average depth greater than one foot. In the event that the settled solids accumulation in an open unit or system exceeds an average thickness of one foot, or in the event that the Permittees otherwise plan to initiate removal of settled solids from an open unit or system, the Permittees shall propose a plan for the removal and disposal of the settled solids from the unit or system. At least 60 days prior to any settled solids removal, the Permittees shall submit to NMED for approval a written settled solids removal and disposal plan. The plan shall include characterization of the settled solids, the estimated volume of settled solids to be removed, a method for removal throughout the unit or system in a manner that is protective of the structural integrity of the unit or system, a schedule for completing the settled solids removal and disposal, and a description of how the settled solids will be contained, transported, and disposed of in accordance with all applicable local, state, and federal laws and regulations. Upon NMED approval, the Permittees shall implement the plan according to the approved schedule.

The Permittees shall keep the inspection log on site for a minimum of five years from the date of inspection. The Permittees shall submit a summary report of all settled solids activities to NMED in the Annual Report submitted by February 1 of each year as well as the Quarterly Report for the period during which the activity occurs.
[NMSA 1978, § 74-6-5.D, 20.6.2.3109.C NMAC, 20.6.2.3107.A NMAC]

11. **FACILITY INSPECTIONS-**The Permittees shall inspect the Facility for malfunctions, deterioration, leaks or spills which may be causing, or may lead to, an unauthorized release to the environment or pose a threat to human health.

    The inspection shall be performed at the frequency prescribed for each unit or system in this Discharge Permit or based on the rate of deterioration of the equipment and the probability of an environmental or human health incident for those units and systems not specifically described herein.
    a. The Permittees shall inspect and test all leak detection systems to ensure performance within manufacturer specifications on a regular monthly basis.
    b. The Permittees shall inspect all externally observable portions of units and systems conveying, treating or storing liquids, semi-liquids, or solids including any secondary containment areas on a weekly basis. The Permittees shall examine for evidence of deterioration or failure of the units and systems. The visible portions of all synthetic liners used to store or dispose of liquids or semi-liquids shall be inspected for uniformity, damage, imperfections, punctures, blisters, and evidence of seam or joint failure on a regular monthly basis.
    c. The Permittees shall inspect, on a weekly basis through indirect observation, all units and systems conveying, processing, or storing liquids, semi-liquids, or solids that are inaccessible or otherwise cannot be directly observed. The Permittees shall identify the unit or system and note any observations which may suggest a breach or failure of containment in

accordance with Condition VI.A.12 (Containment).

d. The Permittees shall inspect all open units and systems which contain a liquid or semi-liquid, on each day during which the Facility is in operation, to ensure capacity of the unit or system is not exceeded.

The Permittees shall record all inspections in an inspection log which shall be kept on site for a minimum of five years from the date of inspection. At a minimum, these inspections shall include the date and time of the inspection, the name of the inspector, identification of the unit, the location of the unit, the total volume of liquid or semi-liquid in the unit or system at the time of inspection, a notation of the observations made, and the date and nature of any maintenance and repairs made.
[20.6.2.3107.A NMAC]

12. **CONTAINMENT**-The Permittees shall institute corrective actions, as necessary, to ensure the protection of ground water and human health. In the event that a unit or system or secondary containment for a unit or system reveals damage that could result in structural failure or a release to the environment, the Permittees shall take the following actions.
    a. The Permittees shall remove the unit or system from service immediately.
    b. The Permittees shall take immediate, and if necessary temporary, corrective actions to minimize the potential for a release.
    c. Within 90 days following identification of the potential failure, the Permittees shall submit to NMED for approval a written corrective action report to include, at minimum, the following.
        1) Identification of the unit or system, or secondary containment for a unit or system in which the failure was observed.
        2) The date and time the failure was observed and the date and time it was estimated to have begun.
        3) The potential cause of the failure.
        4) For units in which a release occurred to secondary containment but was not released to the environment, the rate at which the release occurred and total volume released to the secondary containment.
        5) The characteristics of the waste stream being treated, stored or conveyed by the unit or system, with analytical results from waste stream samples taken with date, time, technical staff collecting the sample and the lab report with QA/QC.
        6) The corrective actions taken to remediate the failure or release with a timeline of when actions were implemented.
        7) Long-term actions, if any, that are proposed to be employed for maintaining the integrity of the secondary containment and the schedule for implementing such actions.
        8) Ongoing measures for monitoring, inspecting, and determining structural integrity of the secondary containment.
        9) Proposed operation and maintenance and repair protocol, if applicable, to be instituted to prevent future failures.

d. If failure of the unit or system or secondary containment resulted in a release to the environment, the Permittees shall comply with the requirements of ConditionVI.C.38 (Spill or Unauthorized Release) of this Discharge Permit.

Upon NMED approval of the corrective action report, the Permittees shall implement any approved long-term actions to maintain the integrity of the secondary containment, and any other approved measures or protocols, according to the approved schedule.
[20.6.2.3107.A NMAC]

13. **MAINTENANCE and REPAIR**-The Permittees shall maintain the function and structural integrity of the Facility at all times except during maintenance or repair. All routine maintenance and repair actions shall be noted in a maintenance log which shall be kept on site for a minimum of five years. Maintenance and repair of a unit or system required due to potential malfunction which could lead to an unauthorized discharge to the environment or pose a threat to human health shall be corrected as soon as possible, but no later than 30 days from the date of the observed malfunction. For good cause, NMED may approve a longer period. The Permittees shall submit to NMED a summary and description of the maintenance and repair activities performed on the Facility as part of the quarterly monitoring reports.

In the event that routine maintenance and repair reveal significant damage likely to affect the structural integrity of a unit or system or any of its associated components, or its ability to function as designed, the Permittees shall implement the requirements of Condition VI.A.14 (Damage to Structural Integrity) of this Discharge Permit.
[20.6.2.3107.A NMAC]

14. **DAMAGE TO STRUCTURAL INTEGRITY**-In the event that an inspection required in this Discharge Permit, or any other observation, reveals damage likely to affect the structural integrity of a unit or system or any of its associated components, or its ability to function as designed, the Permittees shall take the affected unit out of service as quickly as possible, notify NMED orally within 24 hours, and shall propose the repair or replacement of the treatment system or its associated components. Within 30 days after discovery by the Permittees or following notification from NMED that corrective action is required, the Permittees shall submit to NMED for approval a written corrective action plan that includes a schedule for implementation and completion. The Permittees may request an extension of the submittal deadline pursuant to Condition VI.E.53 (Extensions of Time). Upon NMED approval, the Permittees shall implement the plan according to the approved schedule. The Permittees shall remedy any deterioration or malfunction of equipment or structures which are discovered during inspection.
[20.6.2.3107.A NMAC]

15. **FREEBOARD; FREEBOARD EXCEEDANCE-**The Permittees shall maintain two feet of freeboard in all open units and systems that contain a liquid or semi-liquid. If the Permittees determine that two feet of freeboard cannot be maintained, the Permittees shall submit to NMED for approval a written request for alternate freeboard requirements. In the request the Permittees shall, at a minimum, propose freeboard levels that will be maintained and propose demonstrated spill prevention controls and overfill prevention controls that include the prevention of overtopping by wave, wind or precipitation events.

    In the event that established freeboard of two feet or an NMED approved alternative, is not maintained in an open tank, impoundment or other open unit or system that contains a liquid or semi-liquid, the Permittees shall take immediate corrective actions to restore the required freeboard.

    In the event that the required freeboard cannot be restored within a period of 72 hours following discovery, the Permittees shall submit to NMED for approval a proposed corrective action plan to restore the required freeboard within 15 days following the date when exceedance of the required freeboard was initially discovered, The plan shall include a schedule for completion of corrective actions and quantifiable assessments to demonstrate preservation of the required freeboard for a period no less than five years. Upon NMED approval, the Permittees shall implement the corrective action plan according to the approved schedule.
    [NMSA 1978, § 74-6-5.D, 20.6.2.3107.A NMAC, 20.6.2.3109.B & .C NMAC]

16. **EFFLUENT LIMITS: OUTFALL 051-**The Permittees shall not discharge treated waste water to Outfall 051 that exceeds the following limits (or is outside the following pH range):

    a. All water contaminants and their associated limits as listed in Table 1.

Table 1. Effluent Quality Limits for Discharges to Outfall 051

Inorganic Chemicals:	CAS#	mg/L
Aluminum (dissolved)	7429-90-5	5.0
Arsenic (dissolved)	7440-38-2	0.1
Barium (dissolved)	7440-39-3	1.0
Boron (dissolved)	7440-42-8	0.75
Cadmium (dissolved)	7440-43-9	0.01
Chromium (dissolved)	7440-47-3	0.05
Chloride (dissolved)	7647-14-5	250.0
Cobalt (dissolved)	7440-48-4	0.05
Copper (dissolved)	7440-50-8	1.0
Cyanide (dissolved)	57-12-5	0.2
Fluoride(dissolved)	16984-48-8	1.6
Iron (dissolved)	7439-89-6	1.0
Lead (dissolved)	7439-92-1	0.05
Manganese (dissolved)	7439-96-5	0.2
Molybdenum (dissolved)	7439-98-7	1.0
Mercury (total)	92786-62-4	0.002
Nickel (dissolved)	7440-02-0	0.2
Perchlorate (total)	14797-73-0	0.0138
pH (total)		6 – 9
Selenium (dissolved)	7782-49-2	0.05
Silver (dissolved)	7440-22-4	0.05
Sulfate (dissolved)		600.0
Total Dissolved Solids (dissolved)		1000.0
Uranium (dissolved)	7440-61-1	0.03
Zinc (dissolved)	9029-97-4	10.0

Organic Chemicals:	CAS#	mg/L
Benzene (total)	71-43-2	0.01
Benzo (a) pyrene (total)	50-32-8	0.0007
Carbon tetrachloride (total)	56-23-5	0.01
Chloroform (total)	67-66-3	0.1
1,1-Dichloroethane (total)	75-34-3	0.025
1,2-Dichloroethane (total)	107-06-2	0.01
1-1-Dichloroethylene (total)	75-35-4	0.005
1,1,2,2-Tetrachloroethylene (PCE) (total)	127-18-4	0.02
1,1,2-Trichloroethylene (TCE) (total)	86-42-0	0.1
Ethylbenzene (total)	100-41-4	0.75
Ethylene dibromide (total)	1106-93-4	0.0001
Naphthalene plus monomethylnaphthalenes (total)	91-20-3, 90-12-0, 91-57-6	0.03
Methylene chloride (total)	75-09-2	0.1
Total PCBs (total)		0.001
Phenols (total)	108-95-2	0.005
Toluene (total)	108-88-3	0.75
1,1,1-Trichloroethane(total)	74552-83-3	0.06
1,1,2-Trichloroethane (total)	79-00-5	0.01
1,1,2,2-Tetrachloroethane (total)	79-34-5	0.01
Vinyl Chloride (total)	75-01-4	0.001
Xylenes (total)	108-38-3, 1330-20-7, 95-47-6, 106-42-3	0.62

Radioactivity:		pCi/L
Combined Radium-226 & Radium-228 (total)		30

Nitrogen Compounds:		mg/L
Total Nitrogen (sum of TKN+NO_3-N) (dissolved)		15

b. Until LANL is operating new reverse osmosis treatment units, but no later than 120 days following the effective date of this Discharge Permit, the following alternative effluent quality limits for Total Nitrogen shall apply

for discharges to Outfall 051:

- Daily Maximum: 45 mg/L
- Quarterly average: 15 mg/L

c. For any water contaminant that is not listed in Table 1 of this Discharge Permit but is listed as a toxic pollutant in 20.6.2.7.WW NMAC, the limit shall be the concentration listed in Table A-1 of NMED, Risk Assessment Guidance for Site Investigation and Remediation (most recent edition and provided as Appendix 1). For any water contaminant that is not listed in Table 1 of this Discharge Permit or in Table A-1 of the Risk Assessment Guidance, the limit shall be the most recent EPA Regional Screening Level (RSL) for residential tap water. If an RSL is applicable for a carcinogenic water contaminant, the limit shall be adjusted to represent a lifetime risk of no more than one cancer occurrence per 100,000 persons (i.e., a cancer risk of 1×10^{-5}).

In the event that effluent limits are exceeded, the Permittees shall enact the requirements of Condition VI.A.18 (Effluent Exceedance) of this Discharge Permit. Water contaminants that are subject to effective and enforceable limitations in NPDES Permit No. NM0028355 for discharges to Outfall 051 are exempt from the limits set forth in this Condition.
[20.6.2.3107.A NMAC, 20.6.2.3109.C NMAC]

17. **EFFLUENT LIMITS: MES and SET-**The Permittees shall not discharge treated waste water to either the MES or SET that exceeds the following limits (or is outside the following pH range):
    a) All water contaminants and their associated limits as listed in Table 2.

Table 2. Effluent Quality Limits for Discharges to the MES and SET

Inorganic Chemicals:	CAS#	mg/L
Aluminum (dissolved)	7429-90-5	5.0
Arsenic (dissolved)	7440-38-2	0.1
Barium (dissolved)	7440-39-3	2.0
Boron (dissolved)	7440-42-8	0.75
Cadmium (dissolved)	7440-43-9	0.01
Chromium (dissolved)	7440-47-3	0.1
Chloride (dissolved)	7647-14-5	250.0
Cobalt (dissolved)	7440-48-4	0.05
Copper (dissolved)	7440-50-8	1.3
Cyanide (dissolved)	57-12-5	0.2
Fluoride(dissolved)	16984-48-8	1.6
Iron (dissolved)	7439-89-6	1.0

Inorganic Chemicals:	CAS#	mg/L
Lead (dissolved)	7439-92-1	0.05
Manganese (dissolved)	7439-96-5	0.2
Molybdenum (dissolved)	7439-98-7	1.0
Mercury (total)	92786-62-4	0.002
Nickel (dissolved)	7440-02-0	0.2
Perchlorate (total)	04797-73-0	0.0138
pH (total)		6 – 9
Selenium (dissolved)	7782-49-2	0.05
Silver (dissolved)	7440-22-4	0.1
Sulfate (dissolved)		600.0
Total Dissolved Solids (dissolved)		1000.0
Uranium (dissolved)	7440-61-1	0.03
Zinc (dissolved)	9029-97-4	10.0

Radioactivity:		pCi/L
Combined Radium-226 & Radium-228 (total)		30

Nitrogen Compounds:		mg/L
NO_3-N (dissolved)		10

d. Until LANL is operating new reverse osmosis treatment units, but no later than 120 days following the effective date of this Discharge Permit, the following alternative effluent quality limits for NO_3-N shall apply for discharges to the SET and MES:
   - Daily Maximum: 30 mg/L
   - Quarterly average: 10 mg/L

In the event that effluent limits are exceeded, the Permittee shall enact the requirements of Condition VI.A.18 (Effluent Exceedance) of this Discharge Permit.
[20.6.2.3107.A NMAC, 20.6.2.3109.C NMAC]

18. EFFLUENT EXCEEDANCE-In the event that analytical result of an effluent sample indicate an exceedance for any of the effluent limits set forth in Conditions VI.A.16 (Effluent Limits: Outfall 51) and VI.A.17 (Effluent Limits: MES and SET) of this Discharge Permit, the Permittees shall, within 24 hours following receipt of analytical results indicating the exceedance, collect and submit for analysis a subsequent sample for the particular analyte that was in exceedance. In the event the analytical results of the subsequent sample confirm that the maximum limitation has been exceeded (i.e., confirmed exceedance), the Permittees shall take the following actions.

Within 24 hours of becoming aware of a confirmed exceedance, the Permittees shall:

a. Cease discharges to the system for which limits have been exceeded with the exception of the MES to which a confirmed exceedance shall not require immediate cessation;
b. Notify the NMED Ground Water Quality Bureau that an effluent limit set

forth in this Discharge Permit has been confirmed to be in exceedance; and

c. Increase the frequency of effluent sampling to adequately establish the quality of discharges prior to resuming discharges to the system that was in exceedance. The sampling frequency for the particular analyte that was in exceedance shall increase from monthly or quarterly, as required by Condition VI.B.29 (Effluent Sampling) of this Discharge Permit, to weekly. If the particular analyte in exceedance remains below the effluent limit in three consecutive weekly samples, then the Permittees may resume discharges to the system that was in exceedance.

Within one week of becoming aware of a confirmed exceedance, the Permittees shall:

a. Submit copies of the analytical results for the initial and subsequent sample confirming the exceedance to NMED;
b. Examine the internal operational procedures, and maintenance and repair logs, required by Condition VI.A.13 (Maintenance and Repair) of this Discharge Permit, for evidence of improper operation or function of the units and systems; and
c. Conduct a physical inspection of the treatment system to detect abnormalities, and correct any abnormalities.

A report detailing the corrections made shall be submitted to NMED within 30 days following correction.

In the event that analytical results from any two independent monthly effluent samples indicate an exceedance of the effluent limits for all discharge systems set forth in this Discharge Permit within any 12-month period, the Permittees shall propose to modify operational procedures or upgrade the treatment process to achieve the effluent limits. Within 90 days of receipt of the second sample analysis in which effluent limits have been exceeded, the Permittees shall submit to NMED for approval a corrective action plan. The plan shall include a schedule for completion of corrective actions. Upon NMED approval, the Permittees shall implement the corrective action plan according to the approved schedule.

When analytical results from three consecutive months of effluent sampling do not exceed the maximum limitations set forth by this Discharge Permit, the Permittees are authorized to return to a monthly or quarterly monitoring frequency as required in this Discharge Permit.
[NMSA 1978, § 74-6-5.D, 20.6.2.3107.A NMAC, 20.6.2.3109.B NMAC, 20.6.2.3107.C NMAC]

19. PERSONNEL QUALIFICATIONS-Personnel responsible for the operation and maintenance and repair of the Facility shall successfully complete a program of classroom instruction or on-the-job training that provides the skills required to ensure the Facility is operated and maintained in a manner that

complies with this Discharge Permit and all applicable local, state and federal laws and regulations. At a minimum, the operators shall be competent in the following.

a. Management procedures for hazardous waste materials.
b. Conducting inspections.
c. Communications or alarm systems.
d. Emergency response due to unauthorized releases, fire, explosions, or other potential unauthorized releases from the Facility and threat to human health.
e. Emergency shutdown operations.

The operations and maintenance and repair of all or any part of the Facility shall be performed by, or under the direct supervision of, qualified personnel. Facility personnel shall review training and certifications on an annual basis to ensure training and certifications are current with any changes to the Facility's processes.

The Permittees shall maintain the following documents and records at the Facility for current personnel until closure of the Facility.

a. The job title for each position at the Facility with a narrative of the position responsibilities, reporting hierarchy, requisite skill, education and other qualifications assigned to the position.
b. The name of the individual who holds each position and all records documenting training and job experience demonstrating the qualifications of that individual to hold the position.

The Permittees shall maintain all documents and records pertaining to the training of operation and maintenance personnel, including former employees, for a period of five years and shall make such documents and records available to NMED upon request.
[20.6.2.3106.C NMAC, 20.7.4 NMAC]

20. EMERGENCY RESPONSE PROCEDURES The Permittees shall keep and maintain emergency response procedures at the Facility at all times. At a minimum, the procedures shall include the following.

a. Actions Facility personnel must take in response to fires, explosions or any unplanned sudden or non-sudden release of a water contaminant from the Facility to the environment.
b. A spill prevention and response plan to address all unauthorized releases to the environment or those that pose a threat to human health, chronic or acute.
c. A list of all emergency equipment at the Facility that may be utilized in the event of an emergency, its intended function and physical location.
d. An evacuation procedure for all Facility personnel which describes signals to be used to notify personnel of an evacuation, routes to evacuated the Facility and alternate evacuation routes.

e. Description of the use of the Incident Command System (ICS) in response to all emergencies. The ICS is based on the on-scene management structure protocols of the National Incident Management System (NIMS).
f. Conditions under which activation of Los Alamos National Laboratory's Emergency Operations Center (EOC) is appropriate for incidents requiring Laboratory and/or community involvement. The EOC provides a central location for interagency and interjurisdictional coordination and executive decision making in support of an incident response.

The emergency response procedures shall be reviewed, and updated as necessary, by the Permittees on no less than a triennial basis or in the event the plan fails during an emergency, the Facility changes design, construction, or accessibility, key personnel changes or the list of equipment changes. The emergency response procedures shall be made available for inspection at the facility.

The Permittees shall submit a written summary of the procedures to NMED within 120 days of the effective date of this permit (by **Due Date**) and provide written updates no more than 30 days following finalization of an amended plan.
[20.6.2.3109.C NMAC]

21. **INSTALLATION OF FLOW METERS-**Within 180 days following the effective date of this Discharge Permit, (by **Due Date**), the Permittees shall install the following flow meters.
    a. One flow meter to be installed on the RLW influent line to the Facility at a location that will capture and measure all influent to the Facility including waste water conveyed to the Facility by alternative methods (e.g. truck).
    b. One flow meter to be installed on the effluent line to the SET at a location that will capture and measure all discharges of treated water to the SET.
    c. One flow meter to be installed on the effluent line to the MES at a location that will capture and measure all discharges of treated water to the MES.
    d. One flow meter to be installed on the discharge line to Outfall 051 at a location that will capture and measure all effluent discharges to Outfall 051.

    Within 60 days following the installation of flow meters, and within 240 days following the effective date of this Discharge Permit (by **Due Date**), the Permittees shall submit to NMED written confirmation of the meter installation, describing the type, calibration, and location of each flow meter. The flow meters shall be operational except during repair or replacement. Should a meter fail, it shall be repaired or replaced as soon as practical, but no later than 30 days from the date of the failure. Prior to installation of the flow meters, and during periods of repair or replacement, an alternative method for determining the volume of influent and effluent shall be used until the meter is operational.
    [20.6.2.3107.A NMAC, 20.6.2.3109.C NMAC]

22. **CALIBRATION OF FLOW METERS**-All flow meters referenced in this

Discharge permit shall be capable of having their accuracy ascertained under actual working (field) conditions. A field calibration method shall be developed for each flow meter and that method shall be used to check the accuracy of each respective meter. Field calibrations shall be performed within 180 days following the effective date of this Discharge Permit (by **Due Date**) and, at a minimum, on an annual basis thereafter, and immediately upon repair or replacement of a flow meter.

Flow meters for the effluent lines to the SET, the MES and Outfall 051 shall be calibrated to within plus or minus 5 percent of actual flow, as measured under field conditions. The flow meter installed on the 10-inch influent line to the RLWTF shall be calibrated to within plus or minus 10 percent of actual flow, as measured under field conditions. Field calibrations shall be performed by an individual knowledgeable in flow measurement and in the installation and operation of the particular device in use. A calibration report shall be prepared for each flow meter at the frequency calibration is required.

The flow meter calibration report shall include the following information

a. The meter location and identification.
b. The method of flow meter field calibration employed.
c. The measured accuracy of each flow meter prior to adjustment indicating the positive or negative offset as a percentage of actual flow as determined by an in-field calibration check.
d. The measured accuracy of each flow meter following adjustment, if necessary, indicating the positive or negative offset as a percentage of actual flow of the meter.
e. Any flow meter repairs made during the previous year or during field calibration.

The Permittees shall maintain records of flow meter calibration at a location accessible for review by NMED during Facility inspections.
[20.6.2.3107.A NMAC, 20.6.2.3109.C NMAC, 20.6.2.3109.H NMAC]

B. Monitoring and Reporting

23. METHODOLOGIES-Unless otherwise approved in writing by NMED, the Permittees shall conduct sampling and analysis in accordance with the most recent edition of the following documents.

a. American Public Health Association, Standard Methods for the Examination of Water and Waste water.
b. U.S. Environmental Protection Agency, Methods for Chemical Analysis of Water and Waste.
c. U.S. Geological Survey, Techniques for Water Resources Investigations of the U.S. Geological Survey.
d. American Society for Testing and Materials, Annual Book of ASTM Standards, Part 31. Water.

e. U.S. Geological Survey, et al., National Handbook of Recommended Methods for Water Data Acquisition.
f. Federal Register, latest methods published for monitoring pursuant to Resource Conservation and Recovery Act regulations.
g. Methods of Soil Analysis: Part 1. Physical and Mineralogical Methods; Part 2. Microbiological and Biochemical Properties; Part 3. Chemical Methods, American Society of Agronomy;

[20.6.2.3107.A NMAC, 20.6.2.3107.B NMAC]

24. MONITORING REPORTS-The Permittees shall submit monitoring reports to NMED on a quarterly basis. Quarterly sampling and analysis as required in this Discharge Permit shall be performed within the following periods and reports shall be submitted as described below.

a. Sampling and analysis completed between January 1 and March 31– report to be submitted to NMED by May 1.
b. Sampling and analysis completed between April 1 and June 30 – report to be submitted to NMED by August 1.
c. Sampling and analysis completed between July 1 and September 30–report to be submitted to NMED by November 1.
d. Sampling and analysis completed between October 1 and December 31– report to be submitted to NMED by February 1.

[NMSA 1978, § 74-6-5.D, 20.6.2.3109.B NMAC, 20.6.2.3109.C NMAC, 20.6.2.3107.A NMAC]

25. INFLUENT VOLUMES RLW-The Permittees shall measure the volume of all RLW influent waste water being conveyed to the Facility on a daily basis using the flow meter required to be installed pursuant to this Discharge Permit.

The total daily and monthly volumes of RLW influent conveyed to the Facility shall be submitted to NMED in the quarterly monitoring reports.
[20.6.2.3107.A NMAC, 20.6.2.3109.C NMAC, 20.6.2.3109.H NMAC]

26. INFLUENT VOLUMES TRU-The Permittees shall measure the daily volume of TRU influent waste water being conveyed to the Facility using electronic sensors which measure tank levels in both the acid waste and caustic waste influent tanks.

The electronic sensors on these tanks shall be operational except during repair or replacement. Should a sensor used to calculate TRU influent volumes fail, it shall be repaired or replaced as soon as practical, but no later than 30 days from the date of the failure. During repair or replacement, an alternative method for determining the flow of TRU influent shall be used until the defective sensor is repaired or replaced.

Volumes shall be determined by calculation using the head change and tank size. Operators shall record changes in influent tank levels whenever a batch

of TRU waste water is conveyed to the Facility. The total daily and monthly volumes of TRU influent received by the Facility shall be submitted to NMED in the quarterly monitoring reports.
[20.6.2.3107.A NMAC, 20.6.2.3109.C NMAC, 20.6.2.3109.H NMAC].

27. **DISCHARGE VOLUMES**-The Permittees shall measure and record the volume of treated waste water discharged to the SET, MES and Outfall 051 on a daily basis. The Permittees shall determine effluent volumes as follows.
    a. Discharge volumes to the SET shall be determined by daily totalized meter readings on the flow meter required in this Discharge Permit, located on the effluent line to the unit.
    b. Discharge volumes to Outfall 051 shall be determined by daily totalized meter readings on the flow meter required in this Discharge Permit, located on the effluent line to the outfall.
    c. Discharge volumes to the MES shall be determined by daily totalized meter readings on the flow meter required in this Discharge Permit, located on the effluent line to the unit.

    The daily and monthly discharge volumes for the reporting period shall be submitted to NMED in the quarterly monitoring reports.
    [20.6.2.3107.A NMAC, 20.6.2.3109.C NMAC, 20.6.2.3109.H NMAC]

28. **WASTE TRACKING-**The Permittees shall maintain current written or electronic records of all waste streams conveyed to the Facility. At a minimum, the Permittees shall record the following information.
    a. The name of the generator and a unique waste stream identification number.
    b. The time period for which the Permittee approved the generator to convey the waste stream to the Facility.
    c. The location where the waste stream was generated.
    d. Estimated volume and duration of the waste stream, including
        - Estimated number of days per year discharge occurred.
        - Average daily volume received by the Facility when discharge occurred.
        - Maximum daily volume received by the Facility each year when discharge occurred.
        - Estimated total volume discharged to the facility each year.
    e. The waste stream characterization (i.e., analytical data or knowledge of process).
    f. The names of the personnel that approved the receipt of the waste at the Facility (e.g., Waste Certifying official, RCRA Reviewer, and Facility Reviewer).

    Permittees shall also maintain written or electronic records of the following waste streams conveyed from the Facility: Radioactive Liquid Waste Bottoms, low-level sludge, TRU sludge, and low-level solid waste (PPE, sample bottles, filters, membranes, etc). Records will include date of shipment, quantity shipped, description of waste stream, shipping documentation and disposal

location. The Permittees shall allow NMED or an authorized representative to have access to and copy, at reasonable times, records that must be kept under this condition.

The Permittees shall maintain all waste tracking records required by this Condition for five years from the date of the final discharge from the generator of that waste stream. The Permittees shall furnish upon request, and make available at all reasonable times for inspection, the waste tracking records required in this Discharge Permit.
[NMSA 1978, § 74-6-5.D, 20.6.2.3107.A NMAC, 20.6.2.3109.C NMAC]

29. **EFFLUENT SAMPLING** -The Permittees shall sample and analyze effluent waste streams discharged to Outfall 051, the SET, and the MES.

    Treated effluent samples shall be collected once per calendar month for any month in which a discharge occurs to Outfall 051. The Permittees shall collect a grab sample of treated effluent which shall be analyzed for all water contaminants listed in 20.6.2.3103 NMAC, TKN and all toxic pollutants as defined in 20.6.2.7.WW NMAC.

    Treated effluent samples shall be collected once per calendar month for any month in which a discharge occurs to the MES or SET. The Permittees shall collect a grab sample of treated effluent which shall be analyzed for TKN, NO_3-N, TDS, Cl, F and perchlorate.

    The Permittees shall collect and analyze effluent samples once per quarter for any quarterly period in which a discharge occurs to the MES or SET. The Permittees shall collect a grab sample of treated effluent which shall be analyzed for all water contaminants listed in 20.6.2.3103 NMAC and all toxic pollutants as defined in 20.6.2.7.WW NMAC.

    All samples shall be properly prepared, preserved, transported and analyzed in accordance with the parameters and methods authorized in this Discharge Permit and will be submitted to an independent environmental laboratory accredited under the National Environmental Laboratory Accreditation Program. Analytical results shall be submitted to NMED in the quarterly monitoring reports. For any calendar month during which no discharge occurs, the Permittees shall submit a note in the quarterly report documenting the absence of discharge.
    [20.6.2.3107.A NMAC, 20.6.2.3109.C NMAC]

30. **SOIL MOISTURE MONITORING SYTEM FOR THE SET**-Within 120 days following the effective date of this Discharge Permit (by **Due Date**), the Permittees shall submit to NMED for approval a proposed work plan, design and schedule for the installation of a moisture monitoring system for the detection of unauthorized releases from the SET. The system shall be designed

to detect, at a minimum, absolute variations in volumetric soil moisture content below the SET within a precision of 2%. The Permittees shall install the moisture monitoring boreholes in accordance with the final work plan, design and schedule approved by NMED.

The Permittees shall use neutron moisture probes to log the moisture monitoring boreholes following installation to establish baseline conditions and to develop a calibration data set for the probe and a soil moisture action level, to be approved by NMED, which indicates that moisture is being detected below the SET at levels that are above baseline conditions.

Within 90 days following acceptance of the final construction of the moisture monitoring boreholes and prior to discharge to the SET by the Permittees, the Permittees shall submit to NMED for approval the following items.

a. Confirmation that the moisture monitoring borehole installation has been completed.
b. Record drawings of the final design of the completed installation.
c. Reports on the baseline moisture condition and neutron probe calibration.
d. A proposed action level to be used to indicate that elevated moisture has been detected beneath the SET.

Upon approval or approval with conditions by NMED of the completed installation and soil moisture action level, discharge to the SET can commence. The Permittees shall perform quarterly soil moisture monitoring in the moisture monitoring boreholes, and shall provide this information in the quarterly reports required by Condition VI.B.24 (Monitoring Reports).

The moisture monitoring boreholes and neutron probes shall be maintained so that the boreholes remain accessible for monitoring and the probe remains operational. Should the system or a component of the system fail, it shall be repaired or replaced as soon as possible, but no later than 90 days from the date of the failure. For good cause, NMED may approve a longer period.

The Permittees shall maintain all documents and records pertaining to the quarterly monitoring events and maintenance or repair of the soil moisture monitoring system for a period of five years and shall make such documents and records available to NMED upon request.
[20.6.2.3107.A NMAC, 20.6.2.3109.C NMAC]

31. SOIL MOISTURE MONITORING SYSTEM EXCEEDANCE- In the event that the synthetic liner leak detection system identifies a leak, or the soil moisture detection system for the SET detects a soil moisture increase beneath the SET that exceeds the NMED approved action level the Permittees shall take the following corrective actions.

a. Notify the NMED Ground Water Quality Bureau within 24 hours of a

release detected by the release detection system within the synthetic liner.

b. Notify the NMED Ground Water Quality Bureau within 15 days following the date when the soil moisture was initially discovered beneath the SET to exceed the action level.
c. Within 60 days following the date when the soil moisture was initially discovered to exceed the action level, identify the source of the increased soil moisture beneath the SET to NMED and the basis for the identification of the source.

In the event the leak detection system between the primary and secondary liner identifies a leak, or the moisture exceedance in the soil moisture monitoring system is demonstrated to be associated with a leak from or breach of the SET, the Permittees shall cease discharges to the SET, remove all standing liquid from one or both cells (as appropriate), and submit a corrective action plan to NMED, for approval, within 30 days following the date when the Permittees identify the leak. At a minimum, the corrective action plan shall include the following.

a. A proposal for repairing or replacing the synthetic liners within the SET, if leakage through the synthetic liners is found to be the source, or for other repairs.
b. A plan for re-instituting soil moisture monitoring following repairs to the SET to demonstrate that the repairs resolved the source of the increased soil moisture beneath the SET.
c. A schedule for implementation of the corrective action plan elements.

In the event the source of the soil moisture exceedance is demonstrated to be associated with an occurrence other than a failure of the SET, the Permittees shall submit a corrective action plan to NMED, for approval, within 120 days following the date when the soil moisture was initially discovered to exceed the action level. The corrective action plan shall include any actions necessary to ensure the soil moisture detection system is operating within its intended function as required by this Discharge Permit including, but not limited to, re-calibration.

Upon NMED approval, or approval with conditions, the Permittees shall implement the corrective action plan according to the approved schedule.
[20.6.2.3107.A NMAC, 20.6.2.3109.E NMAC]

32. GROUND WATER FLOW-The Permittees shall submit a ground water flow direction report to NMED in the Annual Report in conjunction with the Quarterly Report due February 1. The report shall contain regional, intermediate and alluvial aquifer ground water depth-to-water measurements, existing interconnections with other aquifers (if any are known), a narrative description of the known characteristics of the ground water elevation and flow direction within each aquifer and, to the extent practicable, ground water elevation contour map(s) for the aquifers underlying Sandia, Pajarito, Ten-Site

and Mortandad Canyons.

The ground water elevation contour maps shall depict the ground water flow direction based on the most recent representative ground water elevation data from monitoring wells located in the subject areas. Ground water elevations shall be estimated using common interpolation methods to a contour interval approved by NMED and appropriate to the available data. Ground water elevation contour maps shall depict the water table and potentiometric surfaces, ground water flow directions, and the location and name of each monitoring well and discharge location unit associated with this Discharge Permit. [20.6.2.3107.A NMAC, 20.6.2.3109.C]

33. **REPLACEMENT OF TWO EXISTING ALLUVIAL GROUND WATER MONITORING WELLS –** Within 90 days of the effective date of this Discharge Permit (by **Due Date**), the permittees shall submit to NMED a work plan for the installation of two replacement monitoring wells in the alluvial aquifer at a location hydrologically downgradient of Outfall 051. The well installation work plan will include proposed well locations, drilling methods, well specifications, and proposed schedule for construction. Upon NMED approval, the Permittees shall construct the replacement wells in accordance with the Groundwater Quality Bureau, Monitoring Well Construction and Abandonment Guidelines, Revision 1.1, March 2011and the approved work plan and schedule. A monitoring well completion report documenting the installation will be submitted to NMED within 60 days following completion. [NMSA 1978, § 74-6-5.D, 20.6.2.3109.B NMAC]

34. **MONITORING WELL LOCATION -** In the event that ground water flow information obtained pursuant to this Discharge Permit indicates that a monitoring well is not located hydrologically downgradient of the discharge location it is intended to monitor, NMED may require the Permittees to install a replacement well or wells. Within 90 days following receipt of such notification from NMED, the Permittees shall submit to NMED for approval a well installation work plan, describing each proposed well location, drilling methods and well specifications, and proposing a schedule for construction. Upon NMED approval, the Permittees shall construct the replacement well or wells according to the approved work plan and schedule.

Within 90 days following well completion, the Permittees shall survey the elevation and location of the newly installed replacement monitoring well or wells. Within 120 days following well completion, the Permittees shall submit to NMED a well completion report that will include: construction and lithologic logs, survey data, and a ground water elevation contour map.

Replacement wells shall be located, installed, and completed in accordance with the attachment titled: *Ground Water Quality Bureau Monitoring Well Construction and Abandonment Conditions, Revision 1.1,* March 2011, or

according to other specifications as approved by NMED.
[NMSA 1978, § 74-6-5.D, 20.6.2.3109.B NMAC]

35. **MONITORING WELL CONSTRUCTION -** In the event that information available to NMED indicates that a well is not constructed in a manner consistent with the *Ground Water Quality Bureau Monitoring Well Construction and Abandonment Guidelines, Revision 1.1*, March 2011 or NMED approved specification; contains insufficient water to effectively monitor ground water quality; or is not completed in a manner that is protective of ground water quality, NMED may require the Permittees to install a replacement well or wells. Within 90 days following receipt of such notification from NMED, the Permittees shall submit to NMED for approval a well installation work plan, describing each proposed well location, drilling methods, well specifications, and proposed schedule for construction. Upon NMED approval, the Permittees shall construct the replacement well or wells according to the approved work plan and schedule.

    Within 90 days following well completion, the Permittees shall survey the elevation and location of the newly installed replacement monitoring well or wells. Within 120 days of well completion, the Permittees shall submit to NMED construction and lithologic logs, survey data, and a ground water elevation contour map.

    Replacement wells shall be located, installed, and completed in accordance with the attachment titled: *Ground Water Quality Bureau Monitoring Well Construction and Abandonment Conditions, Revision 1.1*, March 2011**,** or according to other specifications as approved by NMED.

    Upon completion of the replacement monitoring well, the monitoring well requiring replacement shall be properly plugged and abandoned. Well plugging, and abandonment and documentation of the abandonment procedures shall be completed in accordance with the *Ground Water Quality Bureau Monitoring Well Construction and Abandonment Conditions, Revision 1.1*, March 2011, and all applicable local, state, and federal laws and regulations. The well abandonment documentation shall be submitted to NMED within 60 days of completion of well plugging activities.
    [NMSA 1978, § 74-6-5.D, 20.6.2.3107.A NMAC, 20.6.2.3109.B NMAC]

36. **GROUND WATER MONITORING -** The Permittees shall collect ground water samples from the following ground water monitoring wells on a quarterly basis and analyze the samples for TKN, NO_3-N, TDS, Cl, F and perchlorate.
    a. **Replacement Alluvial Well –** Alluvial aquifer replacement well installed as a condition of this Discharge Permit located hydrologically downgradient of Outfall 051.
    b. **Replacement Alluvial Well -** Alluvial aquifer replacement well installed as a condition of this Discharge Permit located hydrologically downgradient

of Outfall 051.

c. **MCOI-6**-previously constructed and located in the intermediate aquifer hydrologically downgradient of Outfall 051.

The Permittees shall collect ground water samples from the following ground water monitoring wells on an annual basis and analyze the samples for all water contaminants listed in 20.6.2.3103 NMAC and all toxic pollutants listed in 20.6.2.7.WW.

a. **Replacement Alluvial Well** – Installed as a condition of this Discharge Permit and hydrologically downgradient of Outfall 051.
b. **Replacement Alluvial Well -** Installed as a condition of this Discharge Permit and hydrologically downgradient of Outfall 051
c. **MCOI-6** - previously constructed and located in the intermediate aquifer presumed to be hydrologically downgradient of Outfall 051.
d. **R-46 -** previously constructed and located in the regional aquifer, topographically downgradient of the RLWTF.
e. **R-60 -** previously constructed and located in the regional aquifer, topographically downgradient of the RLWTF.
f. **R-1** - previously constructed and located in the regional aquifer, topographically downgradient of the RLWTF.
g. **R-14** - previously constructed and located in the regional aquifer, topographically downgradient of the RLWTF.

Sampling shall be done in accordance with the methods authorized in this Discharge Permit and using the following procedure.

a. Measure the ground-water surface elevation, to the nearest hundredth (0.01) of a foot, from the top of the casing, each time ground water is sampled.
b. Calculate total volume of water within the monitoring well using the most recent total depth measurement.
c. For intermediate and regional aquifer wells, purge three well volumes of water from the monitoring well prior to sampling, using an adequate pumping system. For alluvial wells, purge well for a minimum of one well volume.
d. Collect samples from the well using appropriate methods to avoid cross-contamination of the samples and sources.
e. Prepare the Chain-of-Custody, preserve the sample and transport samples in accordance with methods authorized in this Discharge Permit.
f. Samples shall be analyzed by an independent analytical laboratory accredited under the National Environmental Laboratory Accreditation Program (NELAP) using EPA approved test methods.

The Permittees may submit to NMED for approval Standard Operating Procedures developed for the Interim Facility-Wide Groundwater Monitoring Plan that would apply in lieu of the sampling protocols described in this Permit Condition. Upon NMED approval or partial approval of such alternate plan, the approved plan or portion thereof shall apply and be fully enforceable in lieu

of this Permit Condition.

The Permittees shall use sampling and analytical methods that ensure the production of accurate and reliable data indicative of ground water quality in all ground water that may be affected by any discharges from the Facility. The Permittees shall prepare ground water monitoring reports describing, in detail, the sampling and analytical methods used. The ground water monitoring reports shall contain, at minimum, the following information.

a. Date sample was collected.
b. Time sample was collected.
c. Individuals collecting sample.
d. Monitoring well identification.
e. Physical description of monitoring well location.
f. Ground-water surface elevation.
g. Total depth of the well.
h. Total volume of water in the monitoring well prior to sample collection.
i. Total volume of water purged prior to sample collection.
j. Physical parameters including temperature, conductivity, pH, oxidation-reduction potential.
k. Description of sample methods (i.e., constituent being sampled for, container used, preservation methods).
l. Chain-of custody.
m. Map, to scale, identifying monitoring wells and their location.

The ground water monitoring report shall be submitted to NMED with the quarterly monitoring report required in this Discharge Permit.
[20.6.2.3107.A NMAC, 20.6.2.3109.C NMAC]

37. GROUND WATER EXCEEDANCE- NMED reviews ground water data that is generated by the Permittees from samples collected from the monitoring wells identified in this Discharge Permit and other monitoring wells in the vicinity of the Facility. The Permittees report newly detected ground water quality standard exceedances or the newly detected toxic pollutants (as defined in this Discharge Permit and in 20.6.2.7.WW NMAC) in ground water for the entire Laboratory to NMED. If NMED determines that a ground water quality standard is exceeded or that a toxic pollutant is present in ground water, potentially due to a discharge associated with the Facility or defined systems in this Discharge Permit, the Permittees shall submit a ground water investigation/source control work plan to NMED for approval within 60 days following notification to do so by NMED.
At a minimum, the ground water investigation/source control work plan shall include the following elements.

a. A proposal to investigate the source, nature and extent of the ground water contamination, if unknown, which may utilize existing ground water monitoring wells or may propose the installation of new monitoring wells, as appropriate.

b. A proposal to mitigate the discharge or mobilization of the water contaminant which might be causing ground water contamination, as appropriate.
c. A schedule for implementation of the work plan and submittal of a report to NMED.

Upon NMED approval of the ground water investigation/source control work plan, or approval of the plan with conditions, the Permittees shall implement the work plan and submit a written report to NMED in accordance with the approved schedule.

Should the findings of the ground water investigation reveal that a discharge associated with the Facility or defined systems in this Discharge Permit is a source of the ground water contamination, the Permittees shall abate water pollution pursuant to 20.6.2.4000 through 20.6.2.4115 NMAC, following notification from NMED.

This Permit Condition does not apply to an exceedance of ground water quality standard or the presence of a toxic pollutant in ground water unrelated to a discharge associated with the Facility or defined systems in this Discharge Permit, to the extent that abatement of such ground water contamination is occurring, or will occur, pursuant to and in accordance with the June 2016 Compliance Order on Consent (Consent Order) agreed to by NMED, and the Permittees pursuant to the New Mexico Hazardous Waste Act, NMSA 1978, §74-4-10 and the New Mexico Solid Waste Act, NMSA 1978, §74-9-36(D). [NMSA 1978, § 74-6-5.D, 20.6.2.3109.E NMAC, 20.6.2.3107.A NMAC]

C. Contingency Plans

38. SPILL OR UNAUTHORIZED RELEASE-In the event of a release not authorized in this Discharge Permit, the Permittees shall take measures to mitigate damage from the unauthorized discharge and initiate the notifications and corrective actions required in 20.6.2.1203 NMAC and summarized below.

Within 24 hours following discovery of the unauthorized discharge, the Permittees shall orally notify NMED and provide the following information.
a. The name, address, and telephone number of the person or persons in charge of the Facility.
b. The identity and location of the Facility.
c. The date, time, location, and duration of the unauthorized discharge.
d. The source and cause of unauthorized discharge.
e. A description of the unauthorized discharge, including its estimated chemical composition.
f. The estimated volume of the unauthorized discharge.
g. Any actions taken to mitigate immediate damage from the unauthorized discharge.

Within one week following discovery of the unauthorized discharge, the Permittees shall submit written notification to NMED with the information listed above and any pertinent updates.

Within 15 days following discovery of the unauthorized discharge, the Permittees shall submit to NMED for approval a corrective action report and plan describing any corrective actions taken and to be taken to address the unauthorized discharge that includes the following.

a. A description of proposed actions to mitigate damage from the unauthorized discharge.
b. A description of proposed actions to prevent future unauthorized discharges of this nature.
c. A schedule for completion of proposed actions.

Upon NMED approval of the corrective action report and plan, the Permittees shall implement the approved actions according to the approved schedule.

In the event that the unauthorized discharge causes or may with reasonable probability cause water pollution in excess of the standards and requirements of 20.6.2.4103 NMAC, and the water pollution will not be abated within 180 days after notice is required to be given pursuant to 20.6.2.1203.A(1) NMAC, the Permittees may be required to abate water pollution pursuant to 20.6.2.4000 through 20.6.2.4115 NMAC.

Nothing in this condition shall be construed as relieving the Permittees of the obligation to comply with all requirements of 20.6.2.1203 NMAC.
[NMSA 1978, § 74-6-5.D, 20.6.2.1203 NMAC, 20.6.2.3109.B NMAC]

39. FAILURES IN DISCHARGE PLAN/DISCHARGE PERMIT-In the event that NMED or the Permittees identify any failure of the discharge plan or this Discharge Permit not specifically set forth herein, NMED may require the Permittees to submit for its approval a corrective action plan and a schedule for completion of corrective actions to address the failure. Additionally, NMED may require a Discharge Permit modification to achieve compliance with Part 20.6.2 NMAC.
[20.6.2.3107.A NMAC, 20.6.2.3109.E NMAC]

D. Closure

40. CESSATION OF OPERATION OF SPECIFIC UNITS- Within 60 days of the effective date of this Discharge Permit (by **Due Date**), the Permittees shall permanently cease operation of the following units.

a. The 75,000 gallon concrete influent storage tank (75K tank) will be taken out of service as an influent storage tank but remain available for use as emergency storage.

b. The 100,000 gallon steel influent storage tank (100K tank).
c. The two 26,000 gallon concrete clarifiers located within Building 1 of TA-50.
d. The two 25,000 gallon concrete effluent storage tanks (WM2-N, WM2-S).
e. The gravity filter located within Building 1 of TA-50.

Upon the cessation of operation of these specific units, the Permittees shall initiate the requirements for stabilization (Condition 41) of the individual units, systems and components in accordance with this Discharge Permit.
[NMSA 1978, § 74-6-5.D, 20.6.2.3107.A NMAC, 20.6.2.3109.B NMAC, 20.6.2.3109.E NMAC]

41. STABILIZATION OF INDIVIDUAL UNITS AND SYSTEMS - Within 120 days from the permanent cessation of operation of a unit or system, the Permittees shall submit to NMED for approval a written work plan for the stabilization of the unit or system for which operation has ceased. The work plan shall identify activities to be taken, and steps necessary to ensure that the unit or system can no longer receive a discharge and that no further releases of water contaminants occur as a result of the unit or system. At a minimum, the work plan shall include the following.

a. Identification of the unit or system in which cessation of use has occurred.
b. A detailed description of the function of the unit or system.
c. A detailed description of the historic influent waste streams to the unit or system.
d. A detailed description of all conveyance lines leading to the unit or system and a description of how the lines will be terminated, plugged, re-routed or bypassed so that a discharge to the unit or system can no longer occur.
e. Identification of those portions of the approved Closure Plan required in Condition 42 of this Discharge Permit that will be implemented.
f. A description of all proposed interim measures, actions and controls that will be implemented until such time of final removal of the unit, system or component to prevent the release of water contaminants into the environment; to prevent water contaminants, including storm water run-on and run-off, from moving into ground water; and to prevent water contaminants from posing a threat to human health.
g. A detailed description of the actions that will be taken under the Consent Order to investigate and characterize the potential impact to soil and groundwater from the facility, system, or individual unit pursuant to Condition 46.
h. A schedule for implementation.

Upon NMED approval of the work plan, the Permittees shall implement the plan according to the approved schedule.

Within 30 days following the completion of all interim measures, actions and controls as required by this condition, the Permittees shall submit to NMED for

approval a final written report on the actions taken to implement the partial closure.
[NMSA 1978, § 74-6-5.D, 20.6.2.3107.A NMAC, 20.6.2.3109.B NMAC, 20.6.2.3109.E NMAC]

42. CLOSURE PLAN - A closure plan is provided as an Attachment to this Discharge Permit. The closure plan includes the following.

a. A detailed description of how each unit and system at the Facility will be closed.
b. A detailed description of the actions to be taken to decommission, demolish, and remove each unit, system, and other structure, including any secondary containment system components.
c. A detailed description of the actions and controls that will be implemented during closure to prevent the release of water contaminants into the environment; to prevent water contaminants, including run-on and run-off, from moving into ground water; and to prevent water contaminants from posing a threat to human health.
d. A detailed description of the methods to be used for decontamination of the site and decontamination of equipment used during closure.
e. A detailed description of the actions that will be taken to reclaim the site, including placement of clean fill material and re-grading to blend with surrounding surface topography, minimize run-on and run-off, and prevent infiltration of water, and re-vegetation.
f. A detailed description of all monitoring, maintenance and repair, and controls that will be implemented after closure, and of all actions that will be taken to minimize the need for post-closure monitoring, maintenance and repair, and controls.
g. A ground water monitoring plan to detect water contaminants that might move directly or indirectly into ground water after closure, which shall provide for, at a minimum, eight consecutive quarters of ground water monitoring after achieving the standards of 20.6.2.3103 NMAC.
h. A detailed description of the methods that will be used to characterize all wastes generated during closure, including treatment residues, contaminated debris, and contaminated soil, in compliance with all local, state, and federal laws and regulations.
i. A detailed description of the actions that will be taken to investigate and characterize the potential impact to soil and groundwater from the facility, system, or individual unit, or, pursuant to Condition VI.D.46 (Integration with the Consent Order), if the unit or system will be investigated and characterized under the Consent Order, a description of such activities.
j. A detailed description of the methods that will be used to remove, transport, treat, recycle, and dispose of all wastes generated during closure in compliance with all applicable local, state, and federal laws and regulations.
k. A detailed schedule for the closure and removal of each unit and system,

which lists each proposed action and the estimated time to complete it.

For changes that would affect the implementation of the attached Closure Plan, the Permittees shall submit to NMED for approval a written notification and an amended Closure Plan. Permittees will provide annual updates to NMED describing modifications to the Closure Plan. Public comments will be accepted by NMED for a period of 30 days after the submittal of a modified or amended closure plan prior to approval.

[NMSA 1978, § 74-6-5.D, 20.6.2.3107.A NMAC, 20.6.2.3109.B NMAC, 20.6.2.3109.E NMAC]

43. **FINAL CLOSURE - Permittee will notify the NMED a minimum of 120 days prior to initiation of closure activities at the facility.** Once closure begins, and until all closure requirements (excluding post-closure ground water monitoring) are completed, the Permittees shall submit to NMED, with the monitoring reports required in this Discharge Permit, quarterly status reports describing the closure actions taken during the previous reporting period and the actions scheduled for the next reporting period. Within 90 days following the completion of the closure, the Permittees shall submit to NMED for approval a final written report on the actions taken to implement closure.

    Upon termination of the RLWTF mission, Permittee will submit to NMED for approval a revised closure plan for the decommissioning of the active facility that incorporates the same criteria as identified in this condition.

    [NMSA 1978, § 74-6-5.D, 20.6.2.3107.A NMAC, 20.6.2.3109.B NMAC, 20.6.2.3109.E NMAC]

44. **POST-CLOSURE GROUND WATER MONITORING -** After closure has been completed and approved by NMED, the Permittees shall continue ground water monitoring of any wells dedicated to the Facility according to the approved Closure Plan to confirm that the standards of 20.6.2.3103 NMAC are not exceeded and toxic pollutants in 20.6.2.7.WW NMAC are not present in ground water. Such monitoring shall continue for a minimum of eight consecutive quarters.

    If monitoring results show that a ground water quality standard in 20.6.2.3103 NMAC is exceeded or a toxic pollutant in 20.6.2.7.WW NMAC is present in ground water, the Permittees shall implement the requirements of Condition 37 (Ground Water Exceedance) of this Discharge Permit.

    This Permit Condition does not apply to an exceedance of ground water quality standard or the presence of a toxic pollutant in ground water unrelated to a discharge associated with the Facility or defined systems in this Discharge

Permit, to the extent that abatement of such ground water contamination is occurring, or will occur, pursuant to and in accordance with the June 2016 Compliance Order on Consent (Consent Order) agreed to by NMED and the DOE.

Upon demonstration confirming ground water quality does not exceed the standards of 20.6.2.3103 NMAC and does not contain a toxic pollutant in 20.6.2.7.WW NMAC, the Permittees may submit a written request to cease ground water monitoring activities.

Following notification from NMED that post-closure monitoring may cease, the Permittees shall plug and abandon the monitoring well in accordance with the *Ground Water Quality Bureau Monitoring Well Construction and Abandonment Conditions, Revision 1.1,* March 2011.
[NMSA 1978, § 74-6-5.D, 20.6.2.3107.A NMAC, 20.6.2.3109.B NMAC, 20.6.2.3109.F NMAC, 20.6.2.4103.D NMAC]

45. TERMINATION- When all closure and post-closure requirements have been met, the Permittees may submit to NMED a written request for termination of the Discharge Permit.

If the Discharge Permit expires or is terminated for any reason and any standard of 20.6.2.3103 NMAC is or will be exceeded, or a toxic pollutant in 20.6.2.7.WW NMAC is or will be present in ground water, NMED may require the Permittees to submit an abatement plan pursuant to 20.6.2.4104 NMAC.
[NMSA 1978, § 74-6-5.D, 20.6.2.3107.A NMAC, 20.6.2.3109.B NMAC, 20.6.2.3109.F NMAC, 20.6.2.4103.D NMAC]

46. **INTEGRATION WITH THE CONSENT ORDER** -- The investigation, characterization, cleanup and corrective action requirements for potential releases of contaminants into soil, groundwater and other environmental media from "solid waste management units" (SWMUs) and "areas of concern" (AOCs) associated with the Facility and contained within the Compliance Order on Consent (June 2016, Consent Order) entered into between the New Mexico Environment Department and the DOE pursuant to the New Mexico Hazardous Waste Act, NMSA 1978, §74-4-10 and the New Mexico Solid Waste Act, NMSA 1978,§74-9-36(D)(*see* https://www.env.nm.gov/wp-content/uploads/2015/12/LANL_Consent_Order_FINAL.pdf) shall be governed by the Consent Order. The investigation, characterization, cleanup and corrective action of any future SWMUs and AOCs associated with the Facility shall be conducted solely under the Consent Order and not under this Permit until termination of the Consent Order. No activities required under this Permit shall conflict with or duplicate activities required for SWMUs and AOCs identified under the Consent Order. Permittees shall provide information regarding which units and systems are covered by the Consent Order in the submittals required by Conditions VI.D.41 (Stabilization of Individual Units and Systems) and VI.D.43 (Final Closure) of this permit, along with a description of the investigation and characterization that will occur under the Consent Order for each unit and system.
[NMSA 1978, §74-4-10 NMSA 1978,§74-9-36(D)]

E. General Terms and Conditions

47. **APPROVALS -** Upon receipt of a work plan, written proposal, report, or other document subject to NMED approval, NMED will review the document and may either approve the document, approve the document with conditions, or disapprove the document. Upon completing its review, NMED will notify the Permittees in writing of its decision, including the reasons for any conditional approval or disapproval.
[20.6.2.3107.A NMAC, 20.6.2.3109.C NMAC]

48. **RECORD KEEPING -** The Permittees shall maintain a written record of the following information and shall make it available to NMED upon request.
    a. Information and data used to prepare the application for this Discharge Permit.
    b. Records of any releases or discharges not authorized in this Discharge Permit and reports submitted pursuant to 20.6.2.1203 NMAC.
    c. Records, including logs, of the operation and maintenance and repair of all Facility and equipment used to treat, store or dispose of waste water.
    d. Facility record drawings (plans and specifications) showing the actual construction of the Facility and shall comply with the New Mexico Engineering and Surveying Practice Act (Chapter 61, Article 23 NMSA 1978).
    e. Copies of monitoring reports completed and submitted to NMED pursuant

to this Discharge Permit.

f. The volume of waste water or other wastes discharged pursuant to this Discharge Permit.
g. Ground water quality and waste water quality data collected pursuant to this Discharge Permit.
h. Copies of construction records (well logs) for all ground water monitoring wells required to be sampled pursuant to this Discharge Permit.
i. Records of the maintenance and repair, replacement, and calibration of any monitoring equipment or flow measurement devices required by this Discharge Permit.
j. Data and information related to field measurements, sampling, and analysis conducted pursuant to this Discharge Permit.

With respect to sampling and laboratory analysis, the Permittees shall record and maintain following information and shall make it available to NMED upon request.

a. The dates, location and times of sampling or field measurements.
b. The name and job title of the individuals who performed each sample collection or field measurement.
c. The sample analysis date of each sample.
d. The name and address of the laboratory, and the name of the signatory authority for the laboratory analysis.
e. The analytical technique or method used to analyze each sample or collect each field measurement.
f. The results of each analysis or field measurement, including raw data;
g. The results of any split, spiked, duplicate or repeat sample.
h. All laboratory analysis chain-of-custody forms and a description of the quality assurance and quality control procedures used.

The written record shall be maintained by the Permittees at a location accessible during a Facility inspection by NMED for a period of at least five years from the date of application, report, collection or measurement and shall be made available to NMED upon request.
[NMSA 1978, § 74-6-5.D, 20.6.2.3107.D NMAC, 20.6.2.3109.B NMAC]

49. **ELECTRONIC POSTING - MANDATORY** Commencing on the Effective Date of this Discharge Permit the permittees shall, within thirty calendar days of submittal to NMED, post on LANL's Electronic Public Reading Room located at http://eprr.lanl.gov/oppie/service (or as updated) the following submittals to NMED.
    - Condition VI.A1 – Annual Update Report
    - Condition VI.A.3 – Submittal of Plans and Specifications
    - Condition VI.A. 9 – Water Tightness Testing Failure
    - Condition VI.A.14 – Damage to Structural Integrity
    - Condition VI.A.18 – Exceedance of Effluent Standards
    - Condition VI.B.31 – Soil Moisture Monitoring System Exceedance

- Condition VI.B.33 – Alluvial Monitoring Well Replacement Installation Report
- Condition VI.B.37 – Exceedance of Groundwater Quality Standard
- Condition VI.C.38 – Spill or Unauthorized Discharge
- Condition VI.C.39 – Failures in Discharge Plan
- Condition VI.D.42 – Closure Plan Amendments or Modifications
- Condition VI.D.43 – Final Closure Report
- Condition VI.D.45 – Termination

ELECTRONIC POSTING – VOLUNTARY Commencing on the effective date of this Discharge Permit, permittees voluntarily agree to post on LANL's Electronic Public Reading Room located at http://eprr.lanl.gov/oppie/service (or as updated) within seven calendar days after submission to NMED, the information listed below. Because permittees have voluntarily agreed to post the below-information, such posting shall not be subject to civil or criminal enforcement actions.

- Condition VI.A.2 – Notification of Changes
- Condition VI.A.4 – Construction Report
- Condition VI.A.7 – Verification of Secondary Containment
- Condition VI.A.10 – Summary Report for Settled Solids Removal
- Condition VI.A.15 – Freeboard Exceedance Corrective Action Plan
- Condition VI.A.20 – Emergency Response Procedures
- Condition VI.A.21 – Written Confirmation of Installation of Flow Meters
- Condition VI.A.24 – Monitoring Reports
- Condition VI.B.33 – Work plan for Replacement of Two Existing Ground Water Monitoring Wells
- Condition VI.B.34 – Monitoring Well Location Changes
- Condition VI.B.35 – Monitoring Well Construction Report
- Condition VI.D.41- Stabilization of Individual Units and Systems

[20.6.2.3107.A.8 NMAC]

50. **INSPECTION AND ENTRY –** The Permittees shall allow inspection by NMED of the Facility and its operations which are subject to this Discharge Permit and the WQCC regulations. NMED may upon presentation of proper credentials, enter at reasonable times upon or through any premises in which a water contaminant source is located or in which are located any records required to be maintained by regulations of the federal government or the WQCC.

    The Permittees shall allow NMED to have access to and reproduce any copy of the records, and to perform assessments, sampling or monitoring during an inspection for the purpose of evaluating compliance with this Discharge Permit and the WQCC regulations.

Nothing in this Discharge Permit shall be construed as limiting in any way the inspection and entry authority of NMED in the WQA, the WQCC Regulations, or any other local, state or federal laws and regulations.
[NMSA 1978, §§ 74-6-9.B and 74-6-9.E, 20.6.2.3107.D NMAC]

51. **DUTY TO PROVIDE INFORMATION -** The Permittees shall, upon NMED's request, allow NMED to inspect and duplicate any and all records required by this Discharge Permit and furnish NMED with copies of such records.

    Nothing in this Discharge Permit shall be construed as limiting in any way the authority of NMED to gather information as stipulated in the WQA, the WQCC Regulations, or any other local, state or federal laws and regulations.
    [NMSA 1978, §§ 74-6-5.D, 74-6-9.B, and 74-6-9.E, 20.6.2.3107.D NMAC, 20.6.2.3109.B NMAC]

52. **MODIFICATIONS AND AMENDMENTS–** In the event the Permittees propose a change to the Facility or the Facility's discharge that would result in a change in the volume discharged; the location of the discharge; or in the amount or character of water contaminants received, treated or discharged by the Facility, the Permittees shall notify NMED prior to implementing such changes. The Permittees shall obtain written approval (which may require modification of this Discharge Permit) from NMED prior to implementing such changes.
    [NMSA 1978, § 74-6-5.D, 20.6.2.3107.C NMAC, 20.6.2.3109.E NMAC,]

53. **EXTENSIONS OF TIME -** The Permittees may seek an extension of time in which to perform an obligation in this Discharge Permit, for good cause, by sending a written request for extension of time that states the length of the requested extension and describes the basis for the request. NMED shall respond in writing, stating the reasons for any denial.

54. **CIVIL PENALTIES -** Any violation of the requirements and conditions of this Discharge Permit, including any failure to allow NMED staff to enter and inspect records or Facility, or any refusal or failure to provide NMED with records or information, may subject the Permittees to a civil enforcement action. Pursuant to WQA 74-6-10(A) and (B), such action may include a compliance order requiring compliance immediately or in a specified time, assessing a civil penalty, modifying or terminating the Discharge Permit, or any combination of the foregoing; or an action in district court seeking injunctive relief, civil penalties, or both. Pursuant to WQA 74-6-10.C and 74-6-10.1, civil penalties of up to $15,000 per day of noncompliance may be assessed for each violation of the WQA 74-6-5, the WQCC Regulations, or this Discharge Permit, and civil penalties of up to $10,000 per day of noncompliance may be assessed for each violation of any other provision of the WQA, or any regulation, standard, or order adopted pursuant to such other provision. In any action to

enforce this Discharge Permit, the Permittees waives any objection to the admissibility as evidence of any data generated pursuant to this Discharge Permit.
[NMSA 1978, §§ 74-6-10 and 74-6-10.1]

55. **CRIMINAL PENALTIES –** The WQA provides that no person shall:
    a. Make any false material statement, representation, certification or omission of material fact in an application, record, report, plan or other document filed, submitted or required to be maintained in the WQA;
    b. Falsify, tamper with or render inaccurate any monitoring device, method or record required to be maintained in the WQA; or
    c. Fail to monitor, sample or report as required by a permit issued pursuant to a state or federal law or regulation.

    Any person who knowingly violates or knowingly causes or allows another person to violate the requirements of this condition is guilty of a fourth degree felony and shall be sentenced in accordance with the provisions of NMSA 1978, § 31-18-15. Any person who is convicted of a second or subsequent violation of the requirements of this condition is guilty of a third degree felony and shall be sentenced in accordance with the provisions of NMSA 1978, § 31-18-15. Any person who knowingly violates the requirements of this condition or knowingly causes another person to violate the requirements of this condition and thereby causes a substantial adverse environmental impact is guilty of a third degree felony and shall be sentenced in accordance with the provisions of NMSA 1978, § 31-18-15. Any person who knowingly violates the requirements of this condition and knows at the time of the violation that he is creating a substantial danger of death or serious bodily injury to any other person is guilty of a second degree felony and shall be sentenced in accordance with the provisions of NMSA 1978, § 31-18-15.
    [NMSA 1978, §§ 74-6-10.2.A through 74-6-10.2.F]

56. **COMPLIANCE WITH OTHER LAWS -** Nothing in this Discharge Permit shall be construed in any way as relieving the Permittees of the obligation to comply with all applicable federal, state, and local laws, regulations, permits or orders.
    [20.6.2 NMAC]

57. **LIABILITY-** The Permittees shall be jointly and severally liable for all their obligations in this Discharge Permit.
    [NMSA 1978, §§ 74-6-5.A and 74-6-10]

58. **RIGHT TO APPEAL -** The Permittees may file a petition for review before the WQCC on this Discharge Permit. Such petition shall be in writing to the WQCC, shall be filed within thirty days of the receipt of this Discharge Permit, and shall include a statement of the issues to be raised and the relief sought. Unless a timely petition for review is made, the decision of NMED shall be

final and not subject to judicial review.
[NMSA 1978, § 74-6-5.O]

59. **TRANSFER OF OWNERSHIP-** Prior to the transfer of any ownership, control, or possession of this Facility or any portion thereof, the Permittees shall.
    a. Notify the proposed transferee in writing of the existence of this Discharge Permit.
    b. Include a copy of this Discharge Permit with the notice.
    c. Deliver or send by certified mail to NMED a copy of the notification and proof that such notification has been received by the proposed transferee.

    Until both ownership and possession of the Facility have been transferred to the transferee, the Permittees shall continue to be responsible for any discharge from the Facility.
    [20.6.2.3104 NMAC, 20.6.2.3111 NMAC]

60. **PERMIT FEES-** Payment of permit fees is due at the time of Discharge Permit approval. Permit fees shall be paid in a single payment or shall be paid in equal installments on a yearly basis over the term of the Discharge Permit. Payments shall be remitted to NMED no later than 30 days after the Discharge Permit effective date.

    Permit fees are associated with issuance of this Discharge Permit. Nothing in this Discharge Permit shall be construed as relieving the Permittees of the obligation to pay all permit fees assessed by NMED. If the Permittees cease discharging at or from the Facility during the term of the Discharge Permit, they shall nevertheless pay all permit fees assessed by NMED. An approved Discharge Permit shall be suspended or terminated if the Permittees fail to remit payment when due.
    [20.6.2.3114.F NMAC, NMSA 1978, § 74-6-5.K]

VII. Permit Term and Signature

EFFECTIVE DATE:
TERM ENDS:
[20.6.2.3109.H NMAC, NMSA 1978, § 74-6-5.I]

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MICHELLE HUNTER
Chief, Ground Water Quality Bureau
New Mexico Environment Department

Radioactive Liquid Waste Treatment Facility

Closure Plan

DP-1132

September 2016

Los Alamos
NATIONAL LABORATORY
EST.1943

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Acronyms

AOC	area of concern
DOE	U.S. Department of Energy
DOP	detailed operating procedures
DOT	U.S. Department of Transportation
EPA	U.S. Environmental Protection Agency
IWD	Integrated Work Document
IX	ion exchange
LANL	Los Alamos National Laboratory
LLRW	low-level radioactive waste
LLW	low-level waste
NE	northeast
NMED	New Mexico Environment Department
NPDES	National Pollutant Discharge Elimination System
NW	northwest
PPE	personal protective equipment
RCRA	Resource Conservation and Recovery Act
RLWCS	radioactive liquid waste collection system
RLWTF	Radioactive Liquid Waste Treatment Facility
RO	reverse osmosis
RWP	radiation work permit
SCADA	supervisory control and data acquisition
SE	southeast
SET	solar evaporator treatment
SW	southwest
SWMU	solid waste management units
TA	technical area
TLW	transuranic liquid waste
TRU	transuranic
WAC	waste acceptance criteria
WIPP	Waste Isolation Pilot Plant

Definitions

LLW Facility: A new facility that will replace low-level treatment capabilities currently located in Building 50-01. Construction of the LLW Facility began in 2015; it will be designated as Building 50-230.

TLW Facility: A new facility that will replace transuranic treatment capabilities currently located in Building 50-01. Design of the TLW Facility began in 2015.

Balance of plant: A term that refers to facility structures (e.g., floors, walls, roof) and components (e.g., SCADA system, electrical systems, air compressors, chemistry labs) other than water treatment units.

1. Introduction

This Closure Plan describes the future activities to close the Low-Level Radioactive Liquid Waste Treatment Facility (RLWTF) at Technical Area (TA)-50 at Los Alamos National Laboratory (LANL). The Plan describes actions necessary to close the existing RLWTF, and controls that will be implemented during and following closure activities to comply with the provisions specified in Conditions 42 and 43 in the Draft Discharge Permit DP-1132, issued by New Mexico Environment Department (NMED) (2015).

Closure activities include the removal of treatment units, support systems, and structures comprising the existing RLWTF, thereby removing potential sources of releases of contaminants to soil and groundwater. Following completion of closure activities, the footprint area occupied by the current RLWTF will be backfilled to conform to surrounding grades, and revegetated. Following completion of closure activities, a Closure Report will be submitted to the NMED for review and approval.

A consolidated closure schedule is discussed in Section 5 and presented in Figure 4; it presents simultaneous closure of all RLWTF units, systems, and facilities. History and current planning, however, both point to another possibility, that major facility components may be replaced at different times. Such changes will be accompanied by amendment of this Plan, as required by Condition 42 of DP-1132.

2. Overview of RLWTF

The RLWTF is located at Technical Area 50 along Pecos Drive within LANL boundaries. The facility was designed, constructed, and commissioned to replace a treatment facility that had been located in the Los Alamos townsite, near the current intersection of Canyon Road and Central Avenue. The RLWTF has been in operation since 1963.

2.1 Treatment Processes and Facilities

An aerial view of the RLWTF structures at TA50 is presented in Figure 1.The location and generalized layout of buildings and structures, and RLWTF treatment units comprising the RLWTF are depicted on Figure 2. Information in these two figures is discussed in the following two sections.

2.1.1 Treatment Processes

From a *process* perspective, the RLWTF has two treatment systems, one for low-level radioactive wastewater, and a separate treatment system for transuranic (TRU) radioactive wastewater. The volume of transuranic RLW is small, typically one percent or less of the volume of low-level RLW. Both processes use equipment commonly found in wastewater treatment facilities.

- The main treatment process for low-level radioactive wastes consists of influent collection and storage, the treatment of low-level RLW, and the discharge of treated water to the environment. Process steps include treatment with chemicals in a reaction tank, filtration, ion exchange, and reverse osmosis. Discharge to the environment is via NPDES outfall, solar evaporation, or mechanical evaporation using natural gas. Two secondary streams are generated by the main treatment process, solids from the microfilter and reverse osmosis concentrate; they are sent to the secondary treatment process.

  The secondary treatment process for low-level radioactive wastes treats wastes from the main treatment process for low-level RLW, and treated wastewater from the transuranic treatment process. It consists of a rotary vacuum filter to treat solids from the microfilter, secondary reverse osmosis to treat RO concentrate from the main process and/or effluent from the transuranic process, and a bottoms storage and disposal step. Wastes from the secondary treatment process are disposed as low-level radioactive solid waste.

- The transuranic RLW treatment process consists of influent collection and storage, treatment of the transuranic RLW, and the cementation of solids removed during treatment. Treated water, no longer transuranic, is not discharged to the environment. Rather, it is sent to the secondary treatment process for low-level RLW for additional treatment, or for disposition as bottoms. Solids from the transuranic treatment process are concentrated, solidified with cement, and shipped to the Waste Isolation Pilot Plant (WIPP) as a solid transuranic waste.

2.1.2 Treatment Facilities

From a *facility* perspective, the RLWTF can be viewed as having five major components:

- RLWCS (low-level RLW): The low-level radioactive liquid waste collection system is an underground double-walled pipeline system that connects the TA50 RLWTF to generator buildings in six Technical Areas. The collection system has approximately four miles of underground piping and 62 valve stations (referred to as vaults). Vaults are equipped with leak detection sensors that are linked electronically to the RLWTF control room.

- WMRM (low-level RLW): The Waste Management and Risk Mitigation Facility is located about 50 meters southeast of Building 50-01. WMRM houses six tanks, with a capacity of 50,000 gallons each, for the storage of low-level RLW influent. Four of these tanks will be held in reserve for use in emergency situations; two will be used for day-to-day influent collection and storage. Tanks are located in the basement of WMRM; the basement provides secondary containment.

- Building 50-001 and nearby support facilities (low-level RLW): These buildings house the primary and secondary processes for the treatment of low-level radioactive wastes, facility support functions such as HVAC and compressed air, chemical laboratories, and personnel offices. Included are:
    - Building TA50-001, low-level treatment, facility support, laboratories, offices
    - Building TA50-002, influent storage for low-level RLW;
    - Structure TA50-090, influent storage for low-level RLW;
    - Building TA50-248, storage for secondary low-level RLW; and
    - Structure TA50-257, natural gas-fired mechanical evaporator.

- Facilities that house the transuranic treatment processes, including
    - the transuranic RLW collection system, an underground pipe system that conveys transuranic RLW from TA55 to TA50;
    - Structure TA50-066 (also: WM66), influent storage for transuranic RLW;
    - Rooms 60 and 60A in Building TA50-001, for treatment of transuranic RLW

- SET (low-level RLW): The Solar Evaporation Tanks, or SET, which will be used to evaporate treated low-level radioactive liquid wastes. Two tanks are located on this approximately one-acre site within Technical Area 52 of LANL. Evaporation tanks have concrete walls approximately four feet high, and have a double liner with leak detection. Each tank is approximately 70’ x 250’ in size. Approximately 3500 feet of high-density polyethylene transfer piping connect the SET and the TA50 RLWTF.

2.2 Existing Low-Level RLW Treatment

2.2.1 Low-Level RLW Collection System

The RLWCS at LANL consists of approximately four miles of underground, double-walled piping. Primary piping consists of 6- or 8-inch-diameter polyethylene encased within 10- or 12-inch-diameter polyethylene secondary piping. Where the RLWCS piping passes under underground utilities, a minimum clearance (typically 24 inches) is maintained between RLWCS piping and other underground utilities. Where RLWCS piping passes under roadways, piping is installed inside a concrete pipe trench or encased in concrete at sufficient depth to protect the piping from damage from surface vehicle loads.

There are 62 underground valve stations (access vaults) along the four miles of piping. In each vault, primary piping transitions to stainless steel upon entering the vault, then transitions back to polyethylene piping when leaving the vault. Vaults are equipped with leak detection sensors that are linked electronically to the RLWTF control room. Figure 3 depicts a typical low-level RLW collection system pipe trench and valve station.

2.2.2 Low-Level RLW Influent Storage

Influent low-level RLW streams currently flow from vault WM-72 through an underground, double-walled pipe, into influent storage tanks in Structure 50-002, an underground concrete structure. Four water storage tanks and a pumping station are associated with this structure. Two of the tanks, one with a capacity of 75,000 gal (75K Tank) and the other with a capacity of 17,000 gallons (17K Tank), are used to hold untreated low-level RLW influent streams. Influent is fed from these tanks to the low-level treatment process in Building 50-001 via another underground, double-walled pipe.

This storage arrangement will change when Groundwater Permit DP-1132 is issued. When the permit is issued, low-level influent will be directed from vault WM-72 through an underground, double-walled pipe, into influent storage tanks in Structure TA50-250, the WMRM Facility. The WMRM Facility houses two 50,000-gallon storage tanks to accommodate daily use for receipt and storage of influent that will be processed at RLWTF, and houses four additional 50,000-gallon tanks to provide off-normal influent storage capability in the event of off-normal conditions, including unavailability of the RLWTF.

2.2.3 Low-Level RLW Treatment Process

The main treatment process includes treatment with chemicals in a reaction tank, filtration, ion exchange, and reverse osmosis (RO). Main treatment occurs primarily in Rooms 16, 70, and 72 of Building TA50-001. Table 2 provides a summary of the principal structures, individual RLW treatment units, and associated components.

Two secondary streams are generated by the main treatment process: filtration solids and RO concentrate. Both of these are piped to the secondary treatment process for additional treatment. Low-level solids are sent to a rotary vacuum filter in Room 116; RO concentrate is piped to a secondary reverse osmosis unit in Room 24. Both of units generate a liquid waste stream clean enough to be re-treated in the low-level main treatment process, and a waste stream that must be disposed as low-level radioactive solid waste.

2.2.4 Discharge of Treated Low-Level RLW

Treated water from primary reverse osmosis is routed to one of the two 20,000-gallon effluent holding tanks (North and South Frac tanks) in Room 34B of Building 50-001. The two frac tanks are horizontal carbon steel tanks. At the present time, treated liquid waste from the frac tanks is conveyed to an mechanical evaporator in Structure 50-257 where the liquid is evaporated using natural gas.

As an alternative to evaporation, treated water that meets regulatory discharge standards (NPDES, DOE, and NMED) can be discharged to the environment through permitted Outfall 051 in Mortandad Canyon. Treated water is pumped to the outfall through approximately 1,400 feet of three-inch-diameter, carbon steel pipe.

A third discharge alternative has been constructed. Treated low-level RLW will be able to be pumped from the Frac tanks to the Solar Evaporator Tanks at TA52. The SET system consists of two open, lined tanks located on a site of approximately 1 acre, about two-thirds of a mile from the TA-50 RLWTF within TA-52 of LANL. As with the WMRM Facility, the solar evaporation tanks are not currently in use.

Table 3 provides information on the historic waste streams handled in each of the LL RLW treatment units and the low-level RLW collection system.

2.3 Existing Transuranic RLW Treatment

2.3.1 Transuranic RLW Collection System

The Transuranic Radioactive Liquid Waste Collection System (TRU RLWCS) is comprised of three underground, double-walled transfer piping systems: one for conveying acid waste, one for caustic waste, and one spare pipe. Each pipe is approximately 1600 feet in length.

Underground piping is double-wall construction with the interior pipe sizes ranging from 1½ inches to 2 inches. Pipe materials consist of either stainless steel (for the acid waste stream) or thermoplastic material. The piping is encased where it passes below Pecos Drive and is positioned at sufficient depth to protect it from damage by surface vehicle loads. The outer pipe of each line is connected to a drip tray located inside the WM-201 vault such that a leak of the inner pipe drains to a sump inside the WM-201 vault.

The valve station structure located in vault WM-201 (structure TA-50-201) is used to isolate the downstream TRU Influent Storage System from the upstream discharge sources at TA-55. Piping inside the WM-201 vault is single-wall construction. Should there be a leak inside the WM-201 vault, it also drains into the sump in the vault. The WM-201 vault is approximately 1.5 meters (5 feet) below grade and serves as secondary confinement.

2.3.2 Transuranic RLW Influent Storage

The TRU Influent Storage System consists of an acid influent storage tank, caustic influent storage tank, and corresponding transfer/recirculation pumps and piping located in vault WM-66 (Structure TA50-66). Piping components include double-walled transfer pipes, one for acid waste streams and one for caustic waste streams, which are used to transfer transuranic RLW influent streams from vault WM66 to Tank TK1 in Building TA50-01, Room 60/60A, for treatment. Both the acid and caustic influent storage tanks are cylindrical in shape and have conical-shaped bottoms.

The initial TRU RLW influent storage tanks and conveyance piping systems to the TRU processing units in Building 50-001were installed in 1979. The caustic influent tank was replaced in 1983 and again in 2007; the acid influent tank was replaced in 1995.

2.3.3 Transuranic RLW Treatment Process

The TRU RLW treatment process consists of 13 individual vessels having a combined total capacity of approximately 14,200 gallons. Table 4 provides a summary of the individual TRU RLW treatment units contained in the existing RLWTF.

Acid wastes are neutralized using sodium hydroxide; caustic wastes are treated with lime to adjust alkalinity. Both of these treatment steps produce transuranic solids. Treated transuranic RLW is pumped from Room 60 to the low-level secondary treatment plant for additional processing (e.g., to secondary reverse osmosis). TRU solids are solidified in 55-gallon drums using cement. After curing, drums are stored to await shipment to and disposal at the Waste Isolation Pilot Plant (WIPP) as a solid TRU waste form (cement monolith).

Table 5 provides information on the historic waste streams handled in each of TRU RLW treatment unit and TRU RLW collection system.

2.4 Chemicals Used in RLWTF Treatment Processes

Various chemicals are used at the RLWTF:

- Bulk process chemicals used for the treatment of RLW;
- Laboratory chemicals used for analysis-related activities; and
- Ancillary chemicals used for maintenance and general facility operations.

Bulk chemicals include gases (e.g., argon and P-10, a methane-argon mixture), liquids, and powders/solids (e.g., perlite, magnesium sulfate heptahydrate [Epsom salt], and cement used for the solidification of TRU solids). Liquid chemicals include sodium hydroxide for neutralization, sodium permanganate for influent oxidation, sodium silicate as cement wetting agent, and sulfuric acid for pH adjustment.

Most of the chemicals used at the RLWTF are found in the low-level treatment areas and processes. Depending on the type and form of chemical, bulk chemicals are stored in tanks, refrigerated tanks (argon), 55-gallon drums, bags (50-lb or 100-lb bulk),and cylinders (gases).

In addition to bulk chemicals, small quantities of chemicals, typically contained in one-gallon or smaller containers, are used in the analytical chemistry laboratories that support the RLW treatment process. These chemicals are handled and used in accordance with consensus industry standards.

2.5 History of RLWTF Operations

Construction of the current Radioactive Liquid Waste Treatment facility, at Technical Area 50, started in July 1961. It was a replacement for a treatment facility that had been located in the Los Alamos townsite, near the current intersection of Canyon Road and Central Avenue.

The original TA50 facility had just two buildings, 50-01 and 50-02. The process, with a capacity of 250 gallons per minute, consisted of influent storage, chemical precipitation, filtration, and effluent storage. The facility also included laboratories for chemical and radioactive analysis of water samples, facility support functions, and offices. Treatment started in June 1963. In 1964, the first full year of operations, the facility treated 13.6 million gallons of radioactive liquid wastes. (For comparison, the RLWTF treated 0.8 million gallon in 2014.)

In the 53 RLW years since treatment began, a number of facility additions and process modifications and improvements have occurred. **Table**Table 1 presents a synopsis of major RLWTF activities, facility and process additions, and modifications and improvements. Some of these are discussed in the following paragraphs.

- NPDES compliance (1978): The U.S. Environmental Protection Agency was created in 1970, and surface water regulations soon followed. LANL received its first NPDES Permit in 1974 from the Army Corps of Engineers; the permit included only sanitary outfalls. LANL received its second NPDES Permit four years later from the EPA; this permit created effluent limits for all LANL outfalls, including Outfall 051 from the RLWTF.
- Treatment of transuranic RLW (1979): Processing formerly performed at TA21 was relocated to TA55 beginning in 1977. In order to treat transuranic wastes from the new facility, underground transfer lines were installed between TA55 and the RLWTF, influent tanks were constructed (WM66), and treatment equipment was installed in Room 60. First Room 60 treatment of transuranic wastes occurred in July 1979.
- New collection system (1983): The original collection system for low-level radioactive liquid waste was constructed under specifications for sanitary waste systems. Pipes were vitrified clay pipe with asphalted joints and, for road crossings, cast iron pipe. This original system was replaced by the current collection system in 1983. The current system is double-walled, pipeline within a pipeline. Primary piping is six- or eight-inch-diameter polyethylene encased within 10- or 12-inch polyethylene secondary piping. The primary piping transitions to stainless steel in each of the underground valve stations (also referred to as vaults), then transitions back to polyethylene. Vaults are equipped with leak detection sensors that are linked electronically to the RLWTF control room. The majority of the original collection system piping was decommissioned and removed in 1975; excavated soils were characterized for radioactive constituents and remediated.
- Sanitary waste treatment: A septic system was installed at TA50 in 1964 at the south end of the RLWTF. The septic system consisted of a line from Building 50-01 that discharged to a manhole (structure 50-09) and then to a septic tank (structure 50-10). The effluent line from the tank tied to a distribution box (structure 50-11), which discharged to four parallel perforated pipes traversing a leach field. This septic system was removed in 1983 after the RLWTF had been connected to the sewage treatment facility constructed at TA46.
- Membrane treatment processes (1999): The two-step treatment process (chemical precipitation followed by filtration) was unable to meet new, reduced DOE limits for radioactivity in treated water. In order to achieve compliance, major process modifications

were installed beginning in1996 in treatment rooms at the east end of the RLWTF. Post-filtration treatment units that employed membrane separation technology were installed in these rooms. The additional treatment steps, ultrafiltration to remove smaller particles and reverse osmosis to remove much of the dissolved radioactivity, were placed into service in 1999.

- Improved and emergency influent storage (2010): Building 50-250, the Waste Management and Risk Mitigation (WMRM) facility, is located about 50 meters southeast of Building 50-01. WMRM houses six influent storage tanks with a capacity of 50,000 gallons each. It is planned that two of these will be used as influent tanks, and that four will be held in reserve for use in emergency situations. The two daily-use influent tanks will replace existing in-ground tanks that have been in service since 1963.

- Mechanical Evaporation (2011): As an alternate disposal path for treated water, a natural-gas-fired evaporator was installed in a new structure adjacent to Room 34B of Building 50-01. Treated water is evaporated by feeding natural gas to one or two low-NOx burners that can each evaporate up to 200 gallons of water per hour. The unit is constructed of stainless steel, and received a No Permit Required Determination from the NMED Air Quality Bureau.

- Solar Evaporation (2012): Open tanks for solar evaporation of treated low-level RLW have been constructed on a site about two-thirds of a mile from the TA50 RLWTF within Technical Area 52 of LANL. The SET has two identical evaporation tanks and a pump house. Each tank has concrete walls approximately four feet high, and a double liner with leak detection. Each is approximately 70’ x 250’ in size. Approximately 3500 feet of high-density polyethylene (HDPE) transfer piping connect the SET and the TA50 RLWTF.

Continued use of the existing RLWTF for the collection, storage, and treatment of RLW is expected until replacement facilities are available. A new treatment facility for low-level RLW is currently under construction to the immediate west of the existing RLWTF. And new facility is being designed for the treatment of transuranic RLW, to replace the current Room 60 operations. The new transuranic facility will be located about 50 feet from the southeast edge of the existing RLWTF.

3. Closure Objectives and Approach

3.1 Closure Considerations

A number of factors are taken into consideration in developing an approach to closure of the RLWTF. These are discussed in the sections below. An overall approach is then presented in Section 3.2.

NMED Consent Order of 2016:

> In accordance with Condition 46 of the draft Groundwater Permit, the investigation, characterization, and cleanup of existing and future solid waste management units (SWMUs) and areas of concern (AOCs) shall be conducted solely under the NMED Consent Order of June 2016 (Ref. NMED 2016) and not under the Groundwater Permit. No activities required under the Groundwater Permit shall conflict with or duplicate activities required for SWMUs and AOCs identified under the Consent Order. Through the Consent Order, the NMED establishes priorities for investigation, characterization, and cleanup of SWMUs and AOCs across LANL. Closure of the RLWTF will, therefore, be partly or largely dependent upon the Consent Order process used to establish cleanup priorities. A description of this process follows.
>
> New potential Solid Waste Management Units (SWMUs) or Areas of Concern (AOCs) are added to Appendix A (SWMU/AOC List) of the 2016 Consent Order if analytical results from preliminary screening show hazardous constituents in concentrations above residential screening levels. If the analytical results are below residential screening levels, no further action, relative to the Consent Order, is taken. NMED will review analytical results from preliminary screening and make a final determination if the Department of Energy (DOE) proposes not to add a newly discovered potential SWMU or AOC to Appendix A of the Order. A list of "deferred" sites, sites where investigations have not started because of active facility operations or firing site locations, are also identified in Appendix A of the Consent Order. The deferral of corrective action activities may continue at a site until the active facility operations comprising the basis of the deferral are no longer ongoing, at which time DOE will incorporate the site(s) into clean-up campaigns as described in Section VIII (Campaign Approach) of the Order. DOE may also propose partial investigation and partial remediation, if appropriate, for portions of SWMUS and AOCs identified as "Deferred" in Appendix A that become accessible.
>
> Appendix A of the Consent Order is updated annually. Prior to the end of the first quarter of each Fiscal Year (FY), DOE will provide a revision of Appendix A to NMED with proposed changes redlined. The proposed changes will include an update of the status of active SWMUs and AOCs, as well as the addition of newer ones, if appropriate. If NMED approves of the proposed changes, the revision will be incorporated into the Consent Order as Appendix A. If the proposed changes are not approved by NMED, a meeting will be held within 10 business days to resolve NMED's concerns

Equipment Stabilization: Condition 43 of the Groundwater Permit will require stabilization of treatment units or systems for which operation has ceased. Stabilization will include emptying the units of solids and liquids, and isolation so new wastes cannot be introduced to the units. The unit may not be physically decommissioned or removed, but it will pose no threat to the environment or groundwater.

Incremental Closure of Facility Components: The consolidated closure schedule discussed in Section 5 and presented in Figure 4 presents simultaneous closure of all RLWTF units, systems, and facilities. In actuality, major facility components may begin operations at different times, and major facility components will likely be replaced at different times. Many factors can contribute to this possible or likely scenario, such as differing construction and startup times, Consent Order prioritization, Federal funding, and a continuing national mission that may outlive some facilities.

As an historical example, the original low-level collection system was installed in 1963, was replaced after approximately 20 years of service, and was subsequently decommissioned. Meanwhile, other parts of the original RLWTF, also put into service in 1963, have continued in use.

Similarly, current plans call for replacement of the treatment processes in the original Buildings 50-001 and 50-002 over the next decade, while the two collection systems (low-level and transuranic) will continue to be used. In the same time horizon, new major facility components, WMRM and the TA52 SET, are planned to begin operations.

3.2 Closure Approach

Consideration and inclusion of the above-listed factors points to an overall closure sequence with the following steps:

- Operation ends for treatment unit(s) or system(s).
- In accordance with the Groundwater Permit, stabilization preparations and activities commence within 120 days of cessation: submittal of a Stabilization Plan, NMED approval, stabilization, submittal of a stabilization report, and NMED approval of the report. Stabilization will include emptying the units of solids and liquids, and isolation so that new wastes cannot be introduced to the units. The unit may not be physically removed, but it will not pose a threat to the environment or groundwater.
- The unit(s) or system(s) get added to the list of SWMUs for the RLWTF (if not already included). Closure is then planned, scheduled, and executed pursuant to requirements and processes of the NMED Consent Order of June 2016.
- If a replacement facility component is put into operation (e.g., the new low-level treatment facility), then this Closure Plan will be revised to include the replacement facility, then submitted to the Ground Water Bureau for approval.

Section 5.9 and Figure 4 of this Closure Plan discusses an integrated closure of the RLWTF facility, with all major facility components undergoing closure at the same. (i.e., The RLWTF mission has ended, and radioactive liquid waste treatment is no longer required.) However, the

factors identified in Section 3.1 will dictate when closure priorities are assigned, and when closure is initiated.

Condition 43 of DP-1132 will be used to address such uncertainties. Condition 43 provides for amendment of the Closure Plan when changes occur.

3.3 Closure Reports

Closure status reports and final reports will be prepared in accordance with requirements of the NMED Consent Order of June 2016. Reports will be submitted to the NMED Hazardous Waste Bureau and the NMED Ground Water Quality Bureau. Final closure reports will be posted on LANL's Electronic Public Reading Room.

3.4 Closure Completion Standard

Closure of the RLWTF will be deemed complete when RLWTF treatment units and systems, facility units and systems, and aboveground and underground structures associated with the current RLWTF have been removed, and the site regraded and restored for unrestricted use.

3.5 Replacement Low-level Facility

Construction of a new facility for the treatment of low-level RLW started in 2015, The new facility will be called the LLW Facility, has been assigned Building number TA50-230, and is located just west of Building 50-01. (See Figure 1.) Construction will be followed by startup testing and commissioning of both facility equipment (e.g., ventilation and air compressors) and water treatment equipment. Once the new facility has been commissioned, low-level RLW influent will be pumped to Building TA50-230 instead of to Building TA50-01 (assuming LANL has received permission from the NMED to use WMRM). The new facility will then treat low-level influent for a probationary period of approximately one year, to allow increased confidence in the ability of the new facility to perform. During the probationary period, treatment equipment in Building TA50-01 will be maintained in a state of readiness should unanticipated problems be encountered at the new low-level facility. Stabilization of the low-level treatment equipment in Building 50-01 can begin after the replacement treatment facility has proven itself (i.e., after the probationary period).

After low-level treatment has relocated to the new building, Building 50-01 will continue to house transuranic RLW operations. Transuranic treatment will require the use of all Building 50-01 facility systems (ventilation, compressed air, industrial water, change rooms, etc.), the use of chemistry labs, the use of transuranic storage and treatment units, and the use of some low-level treatment units (e.g., secondary reverse osmosis). Personnel offices in Building 50-01 will also continue to be needed and used.

3.6 Transuranic RLW Facility

Design of a new facility for the treatment of transuranic RLW started in 2015. The new facility will be called the TLW Facility, and will located just south of Building 50-01. (See Figure 1.) Current schedules call for the design to be completed in 2017. Once the design has been approved by the DOE, a construction subcontract will be bid and awarded, and the TLW will be built. Construction will be followed by startup testing and commissioning of both facility equipment and water treatment equipment. Once the TLW Facility has been commissioned, transuranic RLW influent will be gravity fed to tanks in the TLW Facility instead of to tanks in Building 50-66. The TLW facility will then treat transuranic influent for a probationary period, to allow increased confidence in the ability of the new facility to perform. During the probationary period, transuranic treatment equipment in Building TA50-01, primarily Room 60, will be maintained in a state of readiness should unanticipated problems be encountered at the TLW facility. Stabilization of transuranic treatment equipment can begin after the replacement treatment facility has proven itself (i.e., after the probationary period).

4. Closure of Individual Units and Systems

4.1 Closure Procedure for Treatment Units and Systems

The following sections describe the general procedures to be followed during closure of individual units, systems and structures present at the RLWTF. Table 6 provides a listing of the individual LL RLW treatment units and systems to be closed, along with a summary of the closure activities to be undertaken to close and remove each unit. Table 7 provides details pertaining to the treatment/storage capacity and construction of the individual treatment units in the RLWTF facility. Table 8 provides a listing of all the individual TRU RLW treatment units and systems to be closed, along with a summary of the closure activities applicable to each. Table 9 lists the remaining balance of plant features (process systems and utilities) that will be closed and removed.

4.1.1 Removal of Containerized Chemicals/Waste Materials

Containers holding process chemicals or miscellaneous waste materials (e.g., liquid or solid wastes) will be removed; tanks holding process chemicals will be emptied. Depending upon their size, containers will be removed with a forklift, container dollies, air pallets, or manually. Containers will be placed on flatbed trucks, trailers, or other appropriate vehicles for transport from each structure/room. Approved containers holding radioactive waste will be moved to a permitted on-site storage unit or transported to a permitted off-site treatment, storage, or disposal facility. Appropriate shipping documentation will be prepared to accompany the waste containers during their transport and off-site disposal.

4.1.2 Structural Assessments

A structural assessment will be conducted to observe and document the starting physical conditions of the rooms or structures housing closed units. The assessment will include inspecting floors, walls and ceilings, and entrance/exit aprons or ramps for portions of above-ground structures. Photographs will be taken and archived to document existing conditions. The perimeter and the floor of each room will be examined for cracks or conditions that indicate a potential for, or evidence of an actual, prior release of constituents. The characterization program (e.g., radionuclide and chemical screening or sampling and analysis) may be modified as appropriate to reflect the results of the structural/visual assessment.

4.1.3 Preparatory Work

Each unit/system will be isolated and/or de-energized as appropriate prior to removal. Valves will be closed and, if not permanently sealed, a lock out/tag out system will be used as appropriate. Initial survey and sampling activities and radiological screening may be conducted to guide decontamination and closure activities and to identify potential waste dispositioning options.

4.1.4 Removal of Solids and Liquids

Removal of solids and liquids from individual LL RLW and TRU RLW treatment units will be accomplished following the applicable LANL Detailed Operating Procedures (DOP) in effect at the time of final closure. An overview of the removal activities that will be undertaken, in the context of current LANL procedures, is summarized below.

- Liquids will be removed from the tanks or vessels either: (1) in accordance with the current unit DOPs or (2) using a portable pump and hoses to evacuate the liquids into a portable collection tank. Removed liquids will be routed to the replacement RLWTF for treatment;
- Solids, if present, will be removed from the tank or vessel either: (1) in accordance with current unit DOPs or (2) using one or more appropriate methods to evacuate the solid materials into a portable collection tank. Removed solids will be routed to the appropriate solids treatment/process unit(s) in the replacement RLWTF for processing and/or packaged, labeled, and manifested for subsequent transport offsite for disposal;

Liquid and solid removal activities will be performed by personnel wearing personal protective equipment (PPE). Radiological data for the associated treatment units, piping, and other equipment will be used to select the appropriate PPE. A LANL Radiation Work Permit (RWP), if required, and a LANL Integrated Work Document (IWD) will be developed and used in combination with the applicable LANL DOP to guide these activities.

The actions required, and estimated durations, for completing removal of the various LL RLW and TRU RLW treatment units (including evacuation of liquids and solids from the individual treatment units) are presented in Table 6 and Table 8. Further details regarding the schedule for completing final closure of individual RLWTF treatment units, and the RLWTF as a whole, are provided in Section 5 below.

4.1.5 Decontamination

Equipment that may be used to decontaminate tanks and vessels, may include, but not be limited to:

- Remote insertable, rotatable mechanism, positioning/mast tool delivery arm, possibly including a high-pressure hose/nozzle system;
- Portable high-pressure washer;
- Sluicer unit, folding arm, sluicing end effectors, sluicer nozzle, and submersible pumps;
- Video cameras to monitor the effectiveness of washing;
- “Baker” tank(s);
- Concrete scabbling devices;
- Sponge media blasting equipment and blasting materials; and
- Radio decontamination solutions.

For emptying solids and washing one or more larger size tanks (e.g., TK-8, TK-9, or a bottoms storage tank in Building 50-248), a remote mechanism containing a rotating, high-pressure water jet/nozzle system, a mast tool delivery system/arm, or other similar system may be deployed either through the top of the tank or through an access hole cut into the side of the tank. In such a case, a high-pressure hose, sluicer, and/or one or more submersible recirculation pumps may be used to complete removal of solid materials from the tank bottom

and adjacent floor/wall joint areas. Sluicer and pump systems employed in this fashion may use submersible pumps to supply excess, dilute tank liquids to wash the internal tank surfaces. This method recycles the tank liquid and avoids adding to the waste volume. Under such a tank decontamination scenario, the tank liquid level during most of the washing activities may be kept at a nominal minimal level (e.g., minimum depth of between approximately 30 cm (12 inches) to 61 cm (24 inches) to ensure uninterrupted sluicing/washing operations.

Specific decontamination activities will be performed by personnel wearing appropriate PPE. Radiological data for the associated treatment units, piping, and other equipment will be used to select appropriate PPE. A LANL RWP, if required, and an IWD will be developed and used in combination with the applicable LANL DOP to guide these activities.

Table 6 and Table 8 summarize decontamination methods and procedures that may be used for decontaminating individual LL RLW and TRU RLW treatment units.

4.1.6 Radiological Surveys

Radiological surveying and sampling to support closure will be done in accordance with existing LANL facility radiation survey plans and procedures. Radiological Control Technicians will perform routine radiation surveys for release of personnel and equipment and general radiological oversight for closure activities. Additional radiological surveys (direct radiological surveying and dose measurements, and smear samples) will be performed following decontamination efforts, to evaluate the effectiveness of decontamination. The results of radiation surveys will be used to support the waste management practices. If practical, radiological release surveys may be conducted on items that may be made available for reuse. Any items or system that cannot be released for reuse will be packaged, labeled, properly manifested, and transported offsite for disposal at an appropriate facility.

4.1.7 Fixative or Paint

Following decontamination of a tank or a vessel, a radionuclide fixative or suitable (e.g., epoxy) paint may be applied to the interior walls and floor of those treatment units/vessels that: (1) were used to store influent; or (2) were used for main (primary) treatment of TRU RLW streams. Application of the fixative is intended to prevent or minimize potential airborne release of radionuclides during activities such as demolition/size-reduction required to assist in minimizing potential exposure to workers, the public, and the environment.

The condition of the fixatives previously applied (mid-1990s) to CL-1, CL-2, and the Gravity Filter will be visually inspected. If the fixative in those vessels is determined to have significantly deteriorated, additional fixative may be applied prior to removing the clarifiers and Gravity Filter during closure.

4.1.8 Removal of Conveyance Piping

Piping associated with RLWTF treatment units and interconnected piping extending between treatment units will be removed, decontaminated if practical and appropriate, and disposed of offsite. Influent conveyance or discharge piping connected to each unit will be removed as part of closure of each unit; some sections of pipe between existing pipe joints may be removed in conjunction with removal of individual treatment vessels/units or may be removed if necessary by making a cut in the piping. In the latter case, valves in the pipe system encompassing the pipe section to be cut will first be closed to isolate the pipe section and any free liquid present in the pipe section will be drained and collected using a portable pump attached via tubing to an appropriate control valve system or by creating a small penetration in the bottom of the pipe

section to allow the liquid to be drained and collected into a sealable collection vessel. Other sections of pipe may be temporarily left in place pending removal of other units. In all cases, ends of any pipe sections left in place (e.g., at pipe joints/pipe junctures) or at pipe cut locations will be capped or flanged using a blind flange, or, where necessary, a plug, molded rubber seal, and/or isolation gasket and fitted end cap. All sections of piping will be removed once all connected vessels/units have been removed.

Pipe removal/free liquid evacuation activities will be performed by personnel wearing appropriate PPE. Radiological data for the associated treatment units, piping, and other equipment will be used to determine approaches for piping/liquids removal and capping/flanging of pipe sections and for selecting appropriate PPE. A LANL RWP and IWD will be developed and used as appropriate to guide these activities.

4.1.9 Removal of Units and Associated Components

Following decontamination, units and their associated components will be removed. Depending on the size of the items (support pedestal, pan, palette, etc.) removal may include use of an excavator, forklift, container dollies, or other equipment. It is expected that removal methods will mimic those used to originally place them into each room. Section room walls or ceiling may be removed as necessary, however the integrity of the remaining structure must be maintained, or the entire structure will be removed, along with the unit.

Larger units may require size-reduction to meet transportation or disposal requirements. Specific methods used for size-reducing individual tanks or vessels, will depend on the composition and size of the item. Table 7 provides a summary of the characteristics of the various individual tanks and vessels comprising the LL RLW and TRU RLW treatment units. Equipment that might be used typically includes a diamond wire saw cutting system, metal saw, pipe cutter, or jackhammer.

The original (1963) clarifiers and gravity filter, which provide structural support for the RLWTF, will be size-reduced in place as will be other units. Additional measures may have to be taken for these units, however, in order to assure building structural safety while during cut-up and removal.

Removal of larger underground concrete structures such as the 75K Tank or the N25K and S25K Tanks in Structure 50-002 may involve partial demolition/segmentation of the tanks structures in place. In such instances, an excavator or backhoe with appropriate attachments (e.g., buckets, demolition shears) will be used to breakup and segregate material. If necessary, a Brokk® demolition/crusher unit or similar limited access demolition machine may be utilized to accomplish this task.

Removed tanks, vessels, components, and demolition debris will be segregated and placed into segregated waste staging areas. All waste material will be properly characterized, packaged, labeled, manifested, and transported offsite for disposal.

4.2 Grouping of Individual Units and Systems

4.2.1 Low-level RLW Units and Systems

The LL RLW collection system components, individual LL RLW treatment units, associated ancillary components to be closed are listed in Table 6. To facilitate closure and scheduling the individual units are grouped into categories or systems which will be closed together. For the LL RLW these categories or systems include:

- Low-level RLW Collection
- Influent Storage
- Main Treatment (Clarify)
- Main Treatment (Ion exchange \ Reverse Osmosis)
- Main Treatment (Filter)
- Main Treatment (Tanks)
- Secondary Reverse Osmosis
- Clean-in Place System
- Effluent Storage
- Effluent Mechanical Evaporation
- Tank Farm
- Solar evaporation tanks
- Canyon discharge piping and NPDES outfall 051

These groups may not necessarily be closed in sequence, but a basic objective will be to facilitate waste management for similar waste streams that are to be remediated together. A summary of the actions required to complete closure of the individual LL RLW treatment units, and closure duration estimates for completing closure of each group of units are presented in Table 6. Detailed descriptions of the capacity and construction of each individual a treatment unit (e.g., tank or vessel) are provided in Table 7.

4.2.2 Transuranic RLW Units and Systems

The TRU RLW collection system components, individual treatment units, and associated ancillary components to be closed are listed in Table 8. The individual units were grouped into categories which may be closed together to best facilitate closure. For the TRU RLW these categories include:

- TRU RLW Collection
- TRU Influent Storage
- TRU Treatment
- TRU solids cementation
- TRU Effluent

These groups may not necessarily be closed in sequence, but a basic objective will be to facilitate waste management for similar waste streams that are to be remediated together. Description of the individual unit's capacity and construction material are included in Table 7. A summary of the actions required to complete closure of the individual TRU RLW treatment units, and closure duration estimates for completing closure of each group of units are presented in Table 8.

4.2.3 Removal of Balance of Plant Facilities and Structures

Following removal of the individual treatment system units remaining facility and process systems (e.g., infrastructure, SCADA systems, natural gas system components, utilities, etc.) will be closed and removed. Once all such systems have been removed, the principal building and other major structures (e.g., concrete vaults holding tanks) will be demolished and removed. Table 9 identifies the facilities and support systems addressed as part of these balance of plant closure activities and provides estimated durations for closing these systems and for subsequently demolishing and removing principal structures. The balance of plant systems are grouped into categories to better facilitate description of, and preliminary sequencing of activities for closing these various systems. The general categories of the balance of plant systems to be closed are as follows:

- Processing support
- Infrastructure
- Utilities
- Building components and structures (i.e., the principal structures to be removed following removal of facility-wide and process systems)
- Stormwater systems

The various facility-wide and process systems will be closed once individual treatment units are decontaminated and removed and a structural assessment completed of the structure that housed these units. The facility and process systems exist across the RLWTF and will be closed in a generally sequential order; however, the specific order of systems closed might be adjusted between categories or within a particular group. For example, the schedule for closing and removing specific utilities might be staggered or delayed to allow for extended use for some utilities during a portion of the (subsequent) demolish/remove structures phase. It is projected that closure of all such systems and demolition and removal of all structures will be accomplished within about 420 days, with most of the removal of facility/process systems accomplished during the first 120 days and demolition and removal of principal structures completed within the last 300 days of that period.

Closure of these facility and process systems follows a similar approach as the individual treatment units. Systems will be isolated, drained or de energized as needed. Systems and equipment that may be reused or are sent for disposal as industrial waste would require radiological release surveys, and possibly decontamination. Material packaged and sent for disposal as LLRW or TRU waste, where applicable, may not require decontamination or radiological surveys.

Demolition and removal of principal building structures and other structures will be accomplished using excavators or backhoe fitted with appropriate attachments (e.g., buckets, demolition shears). As described previously, a Brokk® demolition/crusher unit or similar limited access demolition machine may be utilized to accomplish removal of some portions of building structures if necessary.

As above, these removal activities will be performed by personnel wearing appropriate PPE. Radiological data for the associated treatment units, piping, and other equipment will be used to select appropriate PPE. A LANL RWP and an IWD will be developed and used in combination with the applicable LANL DOP to guide these activities.

4.2.4 Demolition Materials and Debris

Removed sections of building structures and components will be placed into separate controlled staging areas onsite for subsequent processing. Waste will be segregated into the following:

- Uncontaminated bulk material or debris
- Potentially chemically impacted material or debris
- Radiologically contaminated material or debris
- TRU waste

The demolition materials will be segregated according to structure/material type site and based on the results of: (1) history of prior use of the portion of the structure demolished; and (2) results of radiological surveying/swipe samples collected for surfaces of the structures. As required, additional sampling will be conducted during processing of the removed demolition materials to confirm the most appropriate mode of final waste disposition.

Once the disposal requirements and modes are confirmed for materials, and debris, “clean” materials and debris will be loaded into bulk waste transport trucks fitted with proper tarp covers or following size reduction placed into DOT-approved waste shipping containers as required and the containers, labeled, manifested and loaded on flatbed trucks, trailers, or other appropriate vehicles for transport and off-site disposal. Low-level and TRU wastes will be packaged appropriately and staged for shipment to a facility licensed to dispose of such wastes following DOT and marking, labeling, manifesting, and shipping requirements.

4.2.5 Evaluation of Subgrade Conditions

After the removal of the major structures and units the foundation soils, surface or subsurface materials will be sampled to assess the possible residual chemical or radiological constituent concentrations above regulatory and risk-based limits and concentrations that are protective of ground water. NMED requirements for site assessment and verification and confirmation sampling will be followed. This activity is further described in Section 5 below.

5. Other Site Closure Activities

5.1 Surface Water and Groundwater Controls

Prior to removal of treatment tanks and vessels and demolition of the principal structures, a Notice of Intent will be submitted to the Environmental Protection Agency for coverage under the Construction General Permit, and implementation of a Stormwater Pollution Prevention Plan. The Stormwater Pollution Prevention Plan will specify the appropriate Best Management Practices (BMPs) to control erosion and the migration of (potentially contaminated) sediments from the working areas. As necessary, run-on controls will also be established under the Stormwater Pollution Prevention Plan to manage stormwater entering work areas during closure.

Provisions will be taken during closure activities to prevent possible failures of temporarily stored waste containers (e.g., extreme weather changes). Such provisions will include management of the containers under a covered area or within an existing structure or the use of a temporary enclosure, or other appropriate controls as necessary.

Closure-generated wastes will be stored in appropriate containers within the facility. Storage vessels used to accumulate soil or liquid wastes will be appropriately containerized in accordance with regulatory requirements and applicable LANL procedures. Waste managed onsite will include the following controls as applicable:

- Wastes generated will be managed in containers within the facility;
- Containers will be compatible with the waste and the containers will remain closed unless being filled;
- Containers will be labeled to identifying the waste by type (e.g., radioactive or non-radioactive); and
- Spill control equipment will be provided adjacent to the container storage area(s).

5.2 Site Investigation/Characterization

The investigation, characterization, cleanup and corrective action requirements for potential releases of contaminants into soil, groundwater and other environmental media from solid waste management units (SWMUs) and areas of concern (AOCs) associated with the Facility are contained within the Compliance Order of June 2016 entered into between the NMED and the DOE pursuant to the New Mexico Hazardous Waste Act, NMSA 1978, §74-4-10 and the New Mexico Solid Waste Act, NMSA 1978,§74-9-36(D) shall be governed by the Consent Order. The investigation, characterization, cleanup and corrective action of any future SWMUs and AOCs associated with the Facility shall be conducted solely under the Consent Order and not under this Permit until termination of the Consent Order. No activities required under this Permit shall conflict with or duplicate activities required for SWMUs and AOCs identified under the Consent Order. Permittees shall provide information regarding which units and systems are covered by the Consent Order in the submittals required by Conditions VI.D.41 and VI.D.42 of this permit, along with a description of the investigation and characterization that will occur under the Consent Order for each unit and system.

5.3 Decontamination Methods

All equipment used during closure will be decontaminated and radiologically released in accordance with applicable LANL procedures. Where practical, volumetric release surveys as detailed in MARSAME may be used to support release. Any equipment, item or structure which cannot be decontaminated, or radiologically released will be packaged as waste and disposed as appropriate.

Portable berms or other such devices (e.g., membrane-wrapped hay bales, existing secondary containment) will be used to collect excess wash water derived from decontamination activities. Decontamination waste will be collected managed and segregated characterized in the same manner as closure waste. Based on the results of the analysis, the decontamination waste will be managed as low-level radioactive, non-hazardous, or TRU waste.

Decontamination of Equipment

Existing RLWTF equipment which is eligible for reuse may also be decontaminated and radiologically released. Operating machinery, equipment, tools and reusable sampling equipment, that is not sensitive to water intrusion, may be decontaminated by pressure washing or steam cleaning with a solution consisting of a surfactant detergent (e.g., Alconox®) or a decontamination solution (e.g., Radiacwash) and water mixed in accordance with the manufacturer's recommendations. Portable berms, or other such devices (e.g., absorbent socks, plastic sheeting, wading pools, existing secondary containment), will be used collect all wash water and provide containment during the decontamination process.

Equipment that is sensitive to water intrusion, e.g., electronic devices, some tools, will be decontaminated by washing using a wipe-down method with a solution consisting of a surfactant detergent or decontamination solution and water mixed in accordance with the manufacturer's recommendations. Quantities of wash solution used will be minimized by using buckets, spray bottles, or other types of containers. Cleaning cloths, or other absorbent cleaning devices, will not be reused to wipe down the equipment after being wetted in the wash solution or after spraying solution onto the equipment.

Decontamination of Structures

Decontaminating the interior structure may be accomplished using high-pressure washing, sponge media blasting, sluicing, scabbling (e.g., of a portion of the interior walls of a concrete treatment unit or secondary concrete containment structure), or similar processes. All decontamination waste, e.g., water and debris will be contained and properly characterized for disposal. Structures will be radiological surveyed and released in accordance with applicable LANL procedures. Structures and related equipment that are radiologically released will be considered industrial wastes. Any structure that is not radiologically released may be demolished and sent for disposal as LLRW or TRU waste.

Subgrade Conditions Assessment and Excavation

The foundation (subgrade) soils beneath the removed structures will be sampled to identify residual contamination in soils. Samples will be collected of the subgrade soils in accordance with requirements specified in a Sampling and Analysis Plan (See Section 5) and may include sampling in areas considered most susceptible for exhibiting residual contamination. If deemed appropriate at the time of the sampling assessment, soil samples may be collected from other

locations exhibiting visible soil staining or at suspected or known locations of past spills (based on facility operational records) and submitted for laboratory analysis.

If soil is confirmed as being radiologically impacted or exhibiting hazardous constituent concentrations above regulatory or risk-based limits it will be removed and containerized, labeled, and properly manifested pending its final transport and disposal at an appropriate off-site disposal facility. The facility footprint will be radiological surveyed following removal of the identified residual contamination and be released in accordance with applicable DOE and LANL procedures.

5.4 Site Reclamation

Upon completion of the removal of systems, structures or contaminated subgrade soils, the footprint area formerly occupied by the current RLWTF will be regraded to conform with the surrounding natural site grade and conditions and minimize water run-on and run-off. Soil will be placed backfilled and compacted as engineered fill.

Depending on the desired end use, specific regraded areas will then either receive a layer of topsoil and the area will be reseeded with native plant species seeds to promote vegetation growth, or, the area may be regraded to appropriate engineered specifications to accommodate future facility use.

5.5 Post-Closure Monitoring

Final closure of the RLWTF will result in the complete removal of all existing LL RLW and TRU RLW treatment units, process systems and structures comprising the existing RLWTF. Additionally, potential residual contamination in subgrade soils underlying the removed RLWTF structures will be characterized and assessed in accordance with requirements established under the Consent Order (See Section 5.2.) Corrective actions for soils exhibiting radiological and/or chemical constituents at concentrations above regulatory and risk-based limits and/or concentrations that are protective of ground water will be established in accordance with the Consent Order and DOE Order 458.1.

Implementation of the final closure activities will effectively remove all sources of potential radiological or chemical constituents to air, soil and groundwater, and surface water. This should minimize the need for completing post-closure monitoring, maintenance and repairs, and implementation of active or administrative post-closure controls within the footprint area of the existing RLWTF.

5.6 Groundwater Monitoring Plan

Post-closure groundwater monitoring will be conducted at the same wells as that used for operational monitoring, specifically:

- Two new alluvial wells (currently unnamed) located hydrologically downgradient of Outfall 051;
- MCOI-6 - previously constructed and located within perched-intermediate groundwater beneath Mortandad Canyon;
- R-46 - located in the regional aquifer downgradient of the RLWTF;
- R-60 - located in the regional aquifer downgradient of the RLWTF;
- R-1 - located in the regional aquifer downgradient of the RLWTF; and
- R-14 - located in the regional aquifer downgradient of the RLWTF

The groundwater monitoring plan will focus on contaminants that were associated with RLWTF and have the potential to migrate to groundwater (e.g., nitrate, perchlorate, flouride). In the event that groundwater contaminants associated with operations conducted at RLWTF under this permit are detected in any of the wells, an assessment of the condition would be performed, and mitigation may be conducted. An important part of the assessment would be the evaluation of whether a new condition(s) arose in any of the wells associated with operations under the groundwater discharge permit. If mitigation is necessary, sampling will be conducted at applicable wells on a quarterly basis for a minimum of eight consecutive quarters after achieving the standards of NMSA 20.6.2.3103.

5.7 Characterization of Wastes Generated

For documentation purposes, wastes generated during final closure (e.g., treatment residues, contaminated demolition debris, contaminated soil, etc.) will be characterized through sampling and analysis of the wastes to verify waste constituents present and to identify appropriate disposal options for those wastes. Wastes generated during closure will be characterized as follows:

- Representative samples of water, solids, or bottoms, as appropriate, will be collected from tanks and vessels. These samples will be analyzed for appropriate indicator radionuclide constituents (alpha and beta emitters and tritium) and RCRA toxicity-characteristic metals (arsenic, barium, cadmium, chromium, lead, mercury, selenium, and silver).
- Additional analyses may be included based on the tank or vessel being sampled and the historic waste streams handled. For example, following evacuation of liquid and/or solids from tanks and pipe sections that contained or conveyed acids (e.g., nitric acid used in treatment of TRU RLW acid influent treatment in Room 60 of Building 50-001), residual waste liquids or solids may be sampled and analyzed for the RCRA corrosivity characteristic in addition to radionuclides and RCRA toxicity-characteristic metals. As another example, liquids from perchlorate ion exchange vessels may also be sampled for perchlorate.
- As warranted by observations and sample results obtained during decontamination activities, combined with consideration of knowledge or past processes, samples may be collected of solids/scale on the interior wall of selected sections of piping to verify the

presence and concentrations of radionuclides, RCRA toxicity-characteristic metals; and RCRA corrosivity characteristic.

Soil samples will also be collected at selected locations from the subgrade soils beneath the areas formerly occupied by the principal RLWTF principal structures to identify residual impacted soils. Excavated soils will be sampled to confirm concentrations of residual contaminants present and to confirm waste classification for disposal.

All liquid, solids, debris, treatment residues, and soil samples will be analyzed in accordance with LANL waste analysis procedures and applicable local, State, and Federal regulations. Prior to initiating closure activities, a Sampling Analysis Plan will be generated to identify the appropriate methods based on the historical LL RLW and TRU RLW streams treated in the existing RLWTF.

5.8 Disposition of Wastes Generated

Closure activities are likely to generate several different types of waste materials, including nonhazardous industrial wastes, LLRW and TRU wastes. Potential wastes that may be generated are listed in Table along with potential disposal/treatment options. All waste generated during closure will be managed, controlled, handled, characterized, and disposed of in accordance with established LANL waste management procedures and applicable local, State, and Federal laws and regulations.

Waste generated from closure activities will be segregated based on the potential contaminates present in the waste. Particular attention will be focus on limiting the generation of TRU waste, and all waste material will be segregated based on the potential disposal options. The segregated waste will be sampled as necessary to properly characterize the waste, ensure proper waste packaging, labeling, manifesting and acceptance at the applicable disposal facility.

Waste material (liquids and solids) present inside the individual treatment units and vessels will be removed and processed following existing DOPs. To the extent practicable, evacuated wastes will be processed on-site at the replacement RLWTF or may be otherwise treated onsite or off site to meet Land Disposal Restrictions. Waste material that may require additional treatment (solidification, etc.) prior to disposal will be manifested and transported to a licensed treatment facility (e.g., solidification and drumming of certain TRU residual wastes for subsequent shipment to WIPP). Waste will be packaged and transported in accordance with applicable DOT regulations.

Decontaminated equipment and structures may be reused or sent for recycling if they are radiologically released under applicable DOE and LANL procedures. Equipment that is volumetrically contaminated will be evaluated using DOE and LANL procedures for radiological release. Disposable equipment and other equipment that cannot be decontaminated will be containerized and managed as waste.

5.9 Closure Schedule

An integrated closure schedule has been developed that provides projected timetables and estimated durations for completing various steps (phases) required for closing the RLWTF. Figure 4 presents a preliminary closure schedule and provides an anticipated sequence for completing RLWTF closure activities. The schedule would be re-visited and revised prior to the start of Final Closure, and prior to the completion of changes such as replacement low-level and transuranic facilities.

Key phases of the closure work included in the schedule are as follows:

- Stabilization of units in accordance with Condition 41 of DP-1132. Stabilization will include emptying the units of solids and liquids, and isolation so new wastes cannot be introduced to the units. The unit may not be physically decommissioned or removed, but it will pose no threat to the environment or groundwater.
- Through the Consent Order, the NMED will establish the priority for RLWTF closure, which will establish a closure start date.
- Submit an amended Closure Plan to NMED for approval, based upon the Consent Order start date.
- Procure closure contractor(s)
- Implement closure activities including:
  - Decontaminate, decommission, and remove individual treatment units
  - Complete structural assessments of principal structures
  - Remove balance-of-plant facility-wide and process systems
  - Demolish and remove buildings/principal structures
  - Size-reduce, sample, package, manifest, and ship waste materials for disposal
  - Perform verification sampling
  - Restore site
- Prepare and receive approval of Closure Report

Stabilization of existing low-level treatment equipment in Building 50-001 is currently scheduled to start in the first quarter of 2019. This schedule start is contingent upon the current construction schedule, NMED issuance of DP-1132, and NMED concurrence to begin operations in the new low-level treatment facility. This start date also allows for a 12-month probation period for the new facility, during which time the existing low-level treatment facility is maintained in a state of readiness. As figure 4 shows, stabilization would require a little less than two years. Stabilization will leave treatment equipment empty and disconnected, so that it cannot receive additional radioactive liquid waste.

Figure 4 shows that stabilization will be followed by closure. Start date for closure, however, will be dependent upon design and construction of the replacement treatment facility for transuranic RLW because Building 50-01 will continue to be needed for transuranic RLW treatment. Closure start date will also depend upon prioritization assigned under the NMED Consent Order. This Closure Plan will be amended and submitted to the NMED as dates for these future events firm.

Once a closure start date has been established, closure activities are estimated to require two years, not including post-closure monitoring. Table 6, Table 8, and Table 9 provide descriptions of selected activities and additional details regarding estimated durations required for closing and removing each LL RLW and TRU RLW treatment unit and balance-of-plant facility structures and components.

5.10 Final Closure Report

Consistent with DP-1132, proposed Condition VI.D.43 (Final Closure), once closure begins, and until all closure requirements (excluding post-closure ground water monitoring) are completed, LANL will submit quarterly status reports to NMED describing the closure actions taken during the previous reporting period and the actions scheduled for the next reporting period.

Within 90 days of completing closure activities, LANL will submit a final written report for approval on the actions taken to implement closure to NMED, in accordance with DP-1132, proposed Condition VI.D.43.

6. References

Del Signore, J. C. (2014). *75K Leak Test of October 2014*. Report LA-UR-14-29143.

Los Alamos National Laboratory (2014). *Documented Safety Analysis*. TA-50 RLWTF. July 2014.

New Mexico Environment Department (2016). *Compliance Order on Consent U.S. Department of Energy Los Alamos National Laboratory*, June 2016.

New Mexico Environment Department (2015). *Draft Ground Water Discharge Permit DP-1132, Radioactive Liquid Waste Treatment Facility, Los Alamos National Laboratory*. September 18, 2015.

U.S. Environmental Protection Agency (1986 and approved updates). "*Test Methods for Evaluating Solid Waste, Physical/Chemical Methods*," EPA-SW-846, U.S. Environmental Protection Agency, Office of Solid Waste and Emergency Response, Washington, D.C.

APPENDIX A
TABLES

Table 1. Timeline of RLWTF Operations and Facility/Process Modifications

Table 2. Principal Structures and Units to be Closed: Low-level RLW System

Table 3. Historic Waste Streams Handled: Low-Level RLW Treatment Units

Table 4. Principal Structures and Units to be Closed: Transuranic RLW System

Table 5. Historic Waste Streams Handled: Transuranic RLW Treatment Units

Table 6. Closure Actions and Estimated Durations for Low-Level RLW Treatment Units

Table 7. Characteristics of Individual Treatment Units

Table 8. Closure Actions and Estimated Durations for Transuranic RLW Treatment Units

Table 9. Closure Actions and Estimated Durations for Balance of Plant Systems

Table 10. Potential Waste Material Types Generated and Disposal Options

Table 1. Timeline of RLWTF Operations and Facility/Process Modifications

Year/Date of Operation	Aspect of Facility Operation/Facility or Process Addition or Modification
1961 – 1963	Construction of the TA-50 RLWTF
June 27, 1963	TA-50 RLWTF receives first RLW influent
1978	Obtained NPDES Discharge Permit for Discharge Outfall 051 in Mortandad Canyon
1979	Constructed transuranic collection system, structure TA-50-066 to provide transuranic influent storage, and treatment equipment in Room 60. .
July 1979	Created first drum of cemented transuranic solids
1983	Completed the new low-level RLW Collection System, with double-walled piping and leak detection capability at 62 access vaults along the four miles of piping. Majority of the original collection system was decommissioned and removed.
1983	Sanitary wastes sent to the TA46 sewage plant instead of to a septic system with leach field at TA50. Septic system was removed.
1982	Constructed TA-50-090 to provide additional influent storage capacity for low-level RLW waste streams.
1983 – 1984	Enclosed the Room 60 drum tumbler, and began exhausting enclosure emissions through HEPA filters.
1994	Added an emergency power generator in northeast corner of TA-50-001 and replaced main power transformer for TA-50-001.
1995	Replaced TRU RLW acid tank in WM-66
1996	Installed steel 17K Tank in underground concrete tank south of the 75K Tank.
1997	De-scaled internal surfaces of clarifiers then applied epoxy-based paint to cleaned surfaces.
1997	Installed four 20,000-gal above-ground storage tanks in concrete basin in Building 50-248 to provide secondary containment with leak detection capability.
1996-1999	Installation of advanced membrane treatment units (ultrafilter and reverse osmosis) in treatment rooms on the east side of Building 50-01 in response to reduced discharge limits for radioactivity in treated water released to the environment.
2000	Sandblasted interior walls of N25K and S25K Tanks clean and applied impermeable epoxy paint to cleaned walls.
2001	Began use of gravity filter effluent for clarifier chemicals, thereby reducing secondary waste generation rates.
2002	Added perchlorate ion exchange columns per anticipated EPA regulations.
2003	Removed solids from 25,000-gal in-ground, single-walled concrete tank located southwest of N25K and S25K Tanks in Building 50-02.

Table 1. Timeline of RLWTF Operations (concluded)

Year/Date of Operation	Aspect of Facility Operation/Facility or Process Addition or Modification
2010	Added Cu-Zn ion exchange columns to polish permeate from the primary RO unit.
2010	Installed structure TA-50-257 including natural-gas fired boiler/evaporator for evaporation of treated low-level RLW.
2010	Completed construction of Building TA-50-250 (Waste Management/Risk Mitigation Facility) housing six new 50,000-gal storage tanks.
Jan 2, 2011	First evaporation of treated water.
2011	Installed secondary reverse osmosis unit in Room 24
2012	Completed construction of lined Solar Evaporation Tanks (SETs) at TA52 to create an alternative to evaporation using natural gas.
2013	Completed facility modifications and process upgrades per anticipated requirements of a Ground Water Permit.

Table 2. Principal Structures and Units to be Closed: Low-Level RLW System

Structure	Year Built	Description of Structure	Associated LLW Treatment Units *[and other components]*	No. in Permit Application/ Room No. in Structure
50-001 50-002	1963	RLWTF	N.A.	N.A.
N.A	1982	RLWCS	Low-level RLW collection system, including Piping and access vaults and vault alarms.	M1
50-001	1963	Influent Storage	Neutralization Chamber (Tank TK-13) and associated piping	N.A. / Rm 16
50-248	1963	Influent Storage: Below-grade concrete storage tanks structure	17K Tank (untreated RLW storage)	S3
50-002	1963	Influent Storage: Below-grade concrete storage tanks structure	75K Tank (untreated RLW storage)	N.A.
50-090	1986	Influent Storage: Above-ground 100K LL RLW influent storage tank (Tank WM2-N)	100K Tank (untreated LL RLW Influent storage tank)	N.A.
50-250 (WMRM facility)	2010	Influent and Emergency Influent storage facility	Influent Storage Tanks TK5 and TK6	M2 / 50-250 Building
50-250 (WMRM facility)	2010	Emergency Influent storage facility	Emergency influent storage tank TK-1,2,3,4	M3 / 50-250 Building
50-001	1963	Main treatment process	Clarifier #1 and Clarifier #2 and Grit Chamber (idle)	N.A. / Rm 16
50-001	1963	Main treatment process	Gravity Filter	N.A. / Rm 16
50-001	2011	Main treatment process	Pressure Filters	M6 / Rm 63
50-001	2012	Main treatment process	Microfilter	M5 / Rm 70A
50-001	1996	Main treatment process	Reaction tanks TK-71 and TK-72	M4 / Rm 70

Table 2. Principal Low-Level Structures and Units to be Closed (continued)

Structure	Year Built	Description of Structure	Associated LLW Treatment Units *[and other components]*	No. in Permit Application/ Room No. in Structure
50-001	1996	Secondary treatment process	Tank TK-73	S1 / Rm 70
50-002	1996	Main treatment process	Centrifugal Ultrafilter (idle)	N.A. / Rm 71
50-001	1963	Main treatment process	5,000-gallon storage tank (idle)	N.A./Outside TA-50-001, Rm 59
50-002	1963	Main treatment process	Former Low Level solids storage tank (TK-7)	N.A./ TA-50-002
50-001	2010	Main treatment process	IX vessels (Cu-Zn)	M9 / Rm 34B
50-001	2002	Main treatment process	IX vessels (12) (Perchlorate)	M7 / Rm 16
50-001	1963	Main treatment process	Tank TK-9	S2 / Rm 62
50-001	1963	Secondary treatment process	Rotary Vacuum Filter (Secondary Treatment)	S2/ Rm 116B
50-001	1963	Secondary treatment process	Tank TK-8 (Storage of low-level filtration solids)	S2 / Rm 61
50-001	1963	Secondary treatment process	Tank TK-25/Secondary RO units SRO-1; SRO-2 (Secondary RO)	S1 / Rm 24
50-001	1963	Main treatment process	Membrane Clean-in-Place System	N.A.
50-001	1963	Clean-in-Place System	TK-74	N.A.
50-001	1963	LLW Effluent Storage	North and South Frac Tanks	M10 / Rm 34B
50-257	2011	Effluent Evaporator	Natural Gas-Fired Evaporator	M11 / Structure 50-257
50-002	1997	Secondary treatment process	3K tank	S3 / Structure 50-002
50-002	1963	Secondary treatment process	North Tank (N25K) and South Tank (S25K)	WM2-N and WM2-S/ Structure 50-002

Table 2. Principal Low-Level Structures and Units to be Closed (concluded)

Structure	Year Built	Description of Structure	Associated LLW Treatment Units *[and other components]*	No. in Permit Application/ Room No. in Structure
50-248	1996	Secondary treatment process	Tanks TK-NE, TK-SE, TK-SW, and TK-NW	S3/ Structure 50-248
52-181 52-182 52-183	2012	Solar Evaporation Treatment (SET)	Effluent evaporation basins, pump house, and associated cross-site below-grade piping	M11 / Located in TA-52
50-250	2010	Piping	Return line from WMRM Facility (Structure 20-250) to Structure 50-001	N.A.
Outfall #051	1963	NPDES Discharge outfall	Discharge Pipe	N.A.
50-002	1963	Below-grade concrete storage tanks structure	Main wastewater treatment system pumps, and effluent pumps for discharging treated water to Mortandad Canyon	N.A./ Structure 50-002
50-002	1963	Below-grade concrete storage tanks structure	Overflow piping from 75K and 17K Tanks to a sump equipped with sump pumps and piping to the 100K Tank in Structure TA-50-90	N.A./ Structure 50-002
50-090	1986	Above-ground 100K LL RLW influent storage tank (Tank WM2-N)	Secondary containment system including dike wall and connective piping to the 17K Tank in Structure 50-002	N.A./ Structure 50-090

Table 3. Historic Waste Streams Handled: Low-Level RLW Treatment Units

Structure	Description	LL RLW Treatment Unit	Historic Waste Streams Handled
Multiple	LL RLW collection system	LL RLW collection system components, including doubled-walled piping, collection vaults, and probes for leak detection.	influent from facilities that generate LL RLW.
50-001	Main treatment plant housing LLW treatment equipment, analytical labs, utilities, and offices	Clarifiers (CLI-1 and CL-2)	Low-level RLW influent; lime (calcium hydroxide), caustic soda (sodium hydroxide), and iron sulfate additives to precipitate impurities, including radionuclides.
		Gravity Filter	Chemically treated low-level RLW influent from clarifiers. Radioactive concentrations in feed to the Gravity Filter were 85% - 95% reduced from influent concentrations, except for tritium.
		Reaction Tanks TK-71; TK-72	Low-level RLW influent mixed with chemicals such as lime, sodium hydroxide, ferric sulfate, and magnesium sulfate added to adjust pH, precipitate metals, and promote particle growth.
		Microfilter	Treated influent (solid/water mixtures) from reaction tanks TK-71, TK-72 are filtered to separate solids from water.
		Pressure Filters	Treated influent from the clarifiers, the gravity filter, and TK-71 or TK-72 are run through media consisting of coarse- and fine-sized particles of sand, garnet, coal, and gravel.
		Perchlorate Ion Exchange Unit	Filtrate from TK-9 for perchlorate removal prior to treatment in Primary RO Unit.
		Storage Tank TK-9	Receives filtrate from microfilter and pressure filters. Receives permeate from Secondary RO. Additives for pH adjustment.
		Primary RO Unit	Fed from Tank TK-9.
		Cu-Zn Ion Exchange Unit	Permeate from Primary RO Unit in Room 72 run through ion exchange resin bank(s) using makeup water drawn from one of the two Frac Tanks.
		Effluent Storage (North and South Frac) Tanks in Room 34B	Permeate from Primary RO Unit.

Table 3. Historic Low-Level Waste Streams (continued)

Structure	Description	LL RLW Treatment Unit	Historic Waste Streams Handled
50-001		Tank TK-73 (Secondary RO) 3,700-gal tank in Room 70A	Concentrate from the Primary RO Unit.
		Tank TK-25 (Secondary RO) 300-gal tank and SRO-1 and SRO-2 in Room 24	Concentrate from Tank TK-73.
		Solids Storage Tank TK-8	Solids from microfilter or pressure filters.
		Rotary Vacuum Filter	Solids from TK-8 (rotary vacuum filter).
		5,000-gal storage tank (idle)located outside of Room 59.	Nitric acid.
50-002	Below-grade concrete storage tanks structures	75K Tank	Storage of influent from LL RLW collection system.
		17K Tank	Storage of LL RLW influent from LL RLW collection system Storage of RLW bottoms
		N25K and S25K Tanks (treated LL RLW storage)	1963-2000: Storage of treated water from main treatment process having alpha-emitting radionuclide concentrations <1 nCi/L. 2000–2010: Storage of overheads from waste evaporator containing trace radionuclides and no solids. 2011–Present: Storage of drain waters from the effluent evaporator having concentrations of alpha-emitting radionuclides <10 nCi/L and no solids.
		Emptied/abandoned concrete solids storage tank (25,000 gallon).	Storage of LL RLW solids
50-090	Above-ground 100K Storage Tank	100K Tank	Storage of LL RLW influent on as-needed basis. Storage of RLW bottoms on an as-needed basis.

Table 3. Historic Low-Level Waste Streams (concluded)

Structure	Description	LL RLW Treatment Unit	Historic Waste Streams Handled
50-248	Secondary low-level RLW and Bottoms Storage Facility	3K Tank (mixing/transfer tank)	Storage of LL RLW influent from LL RLW collection system Storage of RLW bottoms
		Storage Tanks – NE, SE, SW, and NW	Storage of concentrate from the Primary RO Unit. Storage of RLW bottoms
50-250	Influent and emergency influent storage facility	Influent Storage Tanks TK-5,6	Storage of low-level RLW influent
		Emergency Influent Storage Tanks TK-1,2,3,4	To date: industrial water used to calibrate level probes Potential: low-level RLW influent
52-181 52-182 52-183	Solar Evaporation Tanks (SET)	Geomembrane-lined concrete effluent evaporation tanks (two) and pump house	To date: rainwater Potential: Treated water received from low-level RLW treatment process.

Table 4. Principal Structures and Units to be Closed: Transuranic RLW System

Structure	Year Built	Description of Structure	Associated TRU LLW Treatment Units [and other components]	No. in Permit Application/ Room No. in Structure
TA-50, TA-55, 50-201	1979	TRU RLW collection system	TRU RLW collection system components	T1 / N.A.
50-066, 50-107	1979	Below-grade TRU RLW influent storage tanks	Acid waste tank (original tank replaced in 1995)	T2/ Structure TA-50-66 (Vault WM-66)
50-001	1979	TRU treatment equipment, process tanks, and utilities	Treatment tanks TK-1 and TK-2	T3 / Rm 60
50-001	1979	TRU treatment equipment, process tanks, and utilities	TK-4 (idle)	Rm 60A
50-001	1979	TRU treatment equipment, process tanks, and utilities	Clarifier CL-1 (idle)	Rm 60
50-001	1979	TRU treatment equipment, process tanks, and utilities	Tank TK-6	Rm 60A
50-001	1979	TRU treatment equipment, process tanks, and utilities	Tank TK-7 (idle)	Rm 60A
50-001	1979	TRU treatment equipment, process tanks, and utilities	Pressure filter	Rm 60
50-001	1979	TRU treatment equipment, process tanks, and utilities	Decant filter (idle)	Rm 60A
50-001	1979	TRU treatment equipment, process tanks, and utilities	Piping	Rm60 and 60A

Table 4. **Principal Transuranic Structures and Units to be Closed** (continued)

Structure	Year Built	Description of Structure	Associated TRU LLW Treatment Units [and other components]	No. in Permit Application/ Room No. in Structure
50-001	1979	TRU treatment equipment, process tanks, and utilities	Drum tumbler (original tumbler was replaced in 2007)	T4 / Rm 60A
50-001	2007	TRU treatment equipment, process tanks, and utilities	TK-7A	T4 / Rm 60A
50-001	1979	TRU treatment equipment, process tanks, and utilities	TK-3	T5 / Rm 60
50-066, 50-107	1979	Below-grade TRU RLW influent storage tanks	Caustic waste tank (replaced in 1983 and again in 2007)	T2/ Structure TA-50-66 (Vault WM-66)
50-066, 50-107/50-001	1979	Below-grade TRU RLW influent storage tanks	Piping *[two double-wall transfer pipes connecting Acid and Caustic waste tanks to Tank TK-1 in Rm 60 of Building 50-001]*	T2/Multiple
50-066, 50-107/50-001	1979	Below-grade TRU RLW influent storage tanks	Valves	T2/Multiple
50-066	1979	Below-grade TRU RLW influent storage tanks	Sump with transfer/ recirculation sump pump	N.A./ Structure TA-50-66
50-066	1979	Below-grade TRU RLW influent storage tanks	Ventilation system with exhaust through pre-filter and two stage high efficiency particulate air (HEPA) filter	N.A./ Structure TA-50-66
50-066	1979	Below-grade TRU RLW influent storage tanks	Fabric and metal frame cover enclosure	N.A./ Structure TA-50-66

Table 4. **Principal Transuranic Structures and Units to be Closed** (concluded)

Structure	Year Built	Description of Structure	Associated TRU LLW Treatment Units [and other components]	No. in Permit Application/ Room No. in Structure
50-066	1979	Below-grade TRU RLW influent storage tanks	Structure TA-50-107 - A sampling shed for obtaining liquid samples from the acid and caustic RLW storage tanks	SN.A./ Structure TA-50-66
50-201	1979	Below-grade reinforced concrete TRU RLW valve pit/valve station in Vault WM-201	Vault with sump and valve station	N.A./Structure 50-201 (Vault WM-201)
50-201	1979	Below-grade reinforced concrete TRU RLW valve pit/valve station in Vault WM-201	Double-wall and single-walled piping	N.A./Structure 50-201
50-201	1979	Below-grade reinforced concrete TRU RLW valve pit/valve station in Vault WM-201	Steel frame building with sheet metal sides and roof covering valve pit	N.A./Structure 50-201 N.A./Structure 50-201

Table 5. Historic Waste Streams Handled: Transuranic RLW Treatment Units

Structure	Description	TRU RLW Treatment Unit	Historic Waste Streams Handled
50-001	TRU treatment equipment, process tanks, and utilities	Treatment Tank TK-1	Acid and caustic TRU RLW influent from Tanks AWT-001 and CWT-001. Acid influent is neutralized by mixing with liquid sodium hydroxide; other chemicals (ferric sulfate or polymer) may be added to promote particle growth
		Treatment Tank TK-2	Neutralized acid TRU RLW or un-neutralized liquids from Tank TK-1
		Solids Storage Tank TK-7A	Settled-out solids formed in the neutralized waste and caustic waste influent from Tank TK-1; TK-7A may be seeded with solids left over from the previous treatment campaign and/or chemicals (lime, ferric sulfate, or polymer) to facilitate particle growth
		Effluent Tank TK-3	Water decanted from Tank TK-7A and treated liquid from Tank TK-1 following neutralization
		(Metering) Tank TK-6 (20-gal)	Solids from Tank TK-7
		Drum Tumbler	Solids from TK-7A and Tank TK-6 is mixed in cement and sodium silicate then tumbled to form solidified waste form in drums for off-site disposal (at WIPP)
		Tanks TK-4; TK-7; decant pressure filter – Rooms 60 and 60A	Tank TK-4 and decant pressure filter are installed and available for use if needed. Tank TK-7 has experienced wall corrosion from previous service and is not used for treatment. Tank TK-7 is believed to contain negligible quantity of radioactive material.
50-066	Below-grade TRU RLW influent storage tanks	Acid TRU RLW influent storage tank (AWT-001; 3,900-gal)	TRU RLW influent received in discrete batches from valve pit/valve station in Vault WM-201.
		Caustic TRU RLW influent storage tank (CWT-001; 3,000-gal)	

Table 5. Historic Transuranic Waste Streams (concluded)

Structure	Description	TRU RLW Treatment Unit	Historic Waste Streams Handled
50-201	Below-grade reinforced concrete TRU RLW valve pit/valve station in Vault WM-201	Vault with sump and valve station	TRU RLW influent received from Building 55-04 (via TRU RLW Collection System)
50-248	Treated secondary TRU RLW and bottoms storage facility	Storage tanks (4) – NE, SE, SW, and NW tanks	Storage of treated water from the TRU RLW treatment system units for disposition as bottoms.
N.A	TRU RLW collection system	TRU RLW collection system components	Collection/temporary storage/conveyance of TRU RLW influent from TRU RLW collection system.

Table 6. Closure Actions and Estimated Durations for Low-Level RLW Treatment Units

LL RLW Category	Closure Duration Estimate [1]	Permit Application No.	Vessel/ Item	Room # in 50-001	Other Buildings	Isolate unit	Collect liquid &/or solids sample for analysis	Evacuate (pump or drain) free liquid &/or solids	Route removed liquids/solids to replacement RLWTF for treatment	Decontaminate unit (wash, scabble)	Demolish and remove secondary containment systems	Radiological Survey	Apply Fixative or Paint	Remove treatment unit or vessel & associated components	Size reduce/segment larger removed tanks/vessels if required	Complete Structural Assessments[1]	Demolish and remove structure(s) [1]	Collect subgrade soil sample(s) after removal of structure/unit [1]	Package/ship off-site for processing (e.g., solidification) or disposal off-site[1]
LL RLW Collection System (RLWCS)	NA		Cross Country Line	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA		NA	NA	NA
		M1	Various piping	NA	TA-03, TA-35, TA-48, TA-50, TA-55, TA-59	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA		NA	NA	NA
		M1	Vaults (62), incl. WM-72	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA		NA	NA	NA
			Floor Drains and Sumps	Multiple	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA		NA	NA	NA
Influent Storage	120 days		Piping	Multiple	NA	X	X	X	X	X		X		X	X		X		X
		M2	Neutralization Chamber (TK-13)	16	50-002	X	X	X	X	X	X	X		X	X		X		X
			17,000-gal Tank	NA	50-002	X	X	X	X	X	X	X	X	X	X		X		X
			75,000-gal Tank	NA	50-002							X	X	X	X		X	X	X
			100,000-gal Tank	NA	50-090							X	X	X	X		X	X	X
		M2	WMRM tanks (2)	NA	50-250	X	X	X	X	X		X		X	X		X		X
		M3	WMRM tanks (4)	NA	50-250	X	X	X	X	X		X		X	X		X		X
		M2/ M3	Return line: WMRM to 50-001	NA	50-250	X	X	X	X	X		X		X	X		X		X
Main Treatment (Clarify)	60 days		Clarifier #1	16	NA							X		X	X		X	X	X
			Clarifier #2	16	NA							X		X	X		X	X	X
			Piping	16/116	NA	X	X	X	X	X		X		X	X		X		X
			Gravity Filter	16A	NA							X		X	X		X	X	X
		Idle	Grit Chamber	16	NA	X	NA	NA	NA	NA		X		X	X		X		X
			Storage Tank (TK-8)	61	NA	X	X	X	X	X		X		X	X		X		X
		Idle	RP Filter	61	NA	X						X		X			X		X
		M6	Pressure Filters	63	NA	X					X	X		X			X		X
		Idle	Pilot Ultrafiltration Units	61	NA	X					X	X		X			X		X
			TK-73	70	NA	X	X	X	X	X	X	X		X	X		X		X
			Centrifugal Ultrafilter	71	NA	X						X		X			X		X
Main Treatment (IX/RO)[2]	10 days	M9	IX vessels (Cu-Zn)	34B	NA	X					X	X		X			X		X
		M7	IX vessels (12) (Perchl)	16	NA	X					X	X		X			X		X
		M7	TK-9	62	NA	X					X	X		X	X		X		X
		M8	Primary RO[3] Unit	72	NA	X					X	X		X	X		X		X
Main Treatment (Filter)	30 days	M5	Microfilter	70A	NA	X					X	X		X			X		X
			Piping	70A	NA	X	NA	NA	NA	NA		X		X	X		X		X
			Solids storage Tank	70A	NA	X	X	X	X	X	X	X		X	X		X		X
			Cleaning Tanks	70A	NA	X	X	X	X	X	X	X		X			X		X
		M4	TK-71	70	NA	X	X	X	X	X	X	X		X	X		X		X
		M4	TK-72	70	NA	X	X	X	X	X	X	X		X	X		X		X

[1] Estimated closure durations do not include the time required for completing the activities listed in the last four columns (covered elsewhere). These durations assume steady, advanced funding for closure.

Table 6. Closure Actions and Estimated Durations for Low-Level RLW Treatment Units (concluded)

LL RLW Category	Closure Duration Estimate [1]	Permit Application No.	Vessel/ Item	Room # in 50-001	Other Buildings	Isolate unit	Collect liquid &/or solids sample for analysis	Evacuate (pump or drain) free liquid &/or solids	Route removed liquids/solids to replacement RLWTF for treatment	Decontaminate unit (wash, scabble)	Demolish and remove secondary containment systems	Radiological Survey	Apply Fixative or Paint	Remove treatment unit or vessel & associated components	Size reduce/segment larger removed tanks/vessels if required	Complete Structural Assessments[1]	Demolish and remove structure(s) [1]	Collect subgrade soil sample(s) after removal of structure/unit [1]	Package/ship off-site for processing (e.g., solidification) or disposal off-site[1]
Main Treatment (Tanks)	20 days	*Idle*	Low-level solids storage tank	NA	50-002	X	X	X	X	X		X		X	X		X	X	X
		Idle	Underground tank	62	TA-50-077	X	X	X	X	X		X		X	X		X	X	X
Secondary Reverse Osmosis	20 days	S1	Secondary RO[3] Vessels	24	NA	X	X	X	X	X	X	X		X			X		X
		S1	TK-25 (Storage of concentrate from TK-73)	24	NA	X	X	X	X	X	X	X					X		X
		S2	Rotary vacuum filter	16	NA	X		X	X		X	X		X	X		X		X
		S2	TK-8	24	NA	X	X	X	X	X				X	X		X		X
Clean-in-Place System	10 days		Membrane Clean-in-Place System		NA	X	X	X	X	X		X		X			X		X
			TK-74		NA	X	X	X	X	X		X		X	X		X		X
Effluent Storage	90 days	M10	North FRAC tank	34B	NA	X	X	X	X	X	X	X		X	X		X		X
		M10	South FRAC tank	34B	NA	X	X	X	X	X	X	X		X	X		X		X
		M10	TK-38 (1,000-gal)	38	NA	X	X	X	X	X	X	X		X			X		X
		S3	TK-NE	NA	50-248	X		X				X		X	X		X	X	X
		S3	TK-SE	NA	50-248	X		X				X		X	X		X		X
		S3	TK-SW	NA	50-248	X		X				X		X	X		X	X	X
		S3	TK-NW	NA	50-248	X		X				X		X	X		X		X
		S3	3K Tank	NA	50-248	X	X				X	X		X	X		X	X	X
			N. Overhead Tank (N 25K) (TK-5)	NA	50-002							X		X	X		X	X	X
			S. Overhead Tank (S 25K) (TK-6)	NA	50-002							X		X	X		X	X	X
			Former Underground concrete solids storage tank (TK-7)	NA	50-002							X		X	X		X	X	X
Mechanical Evaporation	60 days	M11	Effluent Evaporator	NA	TA-50-257	X	X	X	X	X		X			X		X	X	X
			Piping	NA	NA	X		X	X	X		X		X	X		X		X
			Pumps, pipes, valves, lines, sinks	NA	NA	X		X	X	X		X		X	X		X		X
Solar Evaporation Tanks	60 days	M11	Solar Evaporation Basins (TA-52)	NA	NA	X	X	X	X	X	X	X		X	X		X	X	X
		M11	Pump house & underground piping	NA	NA	X	X	X	X	X		X		X	X		X		X
NPDES Discharge Outfall #051	NA	M11	Discharge Pipe (Mortandad Canyon)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA		NA	NA	NA

[1] Estimated closure durations do not include the time required for completing the activities listed in the last four columns (covered elsewhere). These durations assume steady, advanced funding for closure.

Table 7. Characteristics of Individual Treatment Units

Unit Operation	Vessel	Capacity (gals.)	Material	Above Below	Secondary Containment	
Main Treatment:						
M1 Collection system	Piping	-	Polyethylene	B	Polyethylene	
	Vaults (62)	-	Concrete	B	-	x
M2 Influent storage	WMRM tanks (2)	50,000	Fiberglass	B	Concrete	z
M3 Emergency influent storage	WMRM tanks (4)	50,000	Fiberglass	B	Concrete	z
M4 Reaction tanks	TK71, TK72	10,000	Steel	A	Concrete-w	z
M5 Microfilter	Filter	40	Steel	A	Concrete-w	
	Solids tank	500	Polyethylene	A	Concrete-w	
	Cleaning tanks	200	Polyethylene	A	Concrete-w	z
M6 Pressure filters	Filters (3)	100	Lined Steel	A	Concrete-w	z
M7 Perchlorate ion exchange	IX vessels (12)	50	Fiberglass	A	Concrete-w	z
	TK09	10,000	Steel	A	Concrete-w	
M8 Primary reverse osmosis	RO vessel	40	Steel	A	Concrete-w	
M9 Cu-Zn ion exchange	IX columns (10)	200	Fiberglass	A	Concrete-w	
M10 Effluent storage	N. Frac, S. Frac	20,000	Steel	A	Concrete-w	z
	TK-38	1,000	HDPE	A	Concrete-w	
M11 Mechanical evaporator	-	1,200	S. Steel	A	Hypalon, Asphalt	
M11 Solar evaporation	E. Tank, W. Tank	380,000	HDPE	A	HDPE, Concrete	z
M11 NPDES Outfall #051	-	-	-	B	-	y

w: Floor of Building 50-001, with sumps or floor drains, provides secondary containment.
x: Vaults provide secondary containment.
y: Pipe is below grade; the outfall is at the surface.
z: Capacity is for each vessel.
HDPE: high-density polyethylene

Table 7. Characteristics of Individual Treatment (concluded)

Unit Operation	Vessel	Capacity (gals.)	Material	Above Below	Secondary Containment	
Transuranic:						
T1 TRU Collection system	-	-	PVDF, PP	B	PVDF, PP	
T2 TRU Influent storage	Acid tank	3,900	Steel	B	Concrete	
	Caustic tank	3,000	Steel	B	Concrete	
T3 TRU Treatment	TK1	900	Steel	A	Concrete-w	
	TK2	800	Fiberglass	A	Concrete-w	
T4 TRU Solids	TK-7A	900	Steel	A	Concrete-w	
	T4	55	Fiberglass	A	Concrete-w	
T5 TRU Effluent	TK3	1,000	Fiberglass	A	Concrete-w	
Secondary Treatment:						
S1 Secondary reverse osmosis	RO vessel	10	Fiberglass	A	Concrete-w	
	TK25	300	Polyethylene	A	Concrete-w	
	TK73	3,700	Steel	A	Concrete-w	
S2 Rotary vacuum filter	Rotary vacuum filter	900	S. Steel	A	Concrete-w	
	TK8	8,000	Steel	A	Concrete-w	
S3 Bottoms storage	TK-NE, SE, SW, NW	20,000	Steel	A	Concrete	z
	3K Tank	3,000	Steel	B	Concrete	
	17K Tank	17,000	Steel	B	Concrete	

w: Floor of Building 50-001, with sumps or floor drains, provides secondary containment.
x: Vaults provide secondary containment.
y: Pipe is below grade; the outfall is at the surface.
z: Capacity is for each vessel.
PVDF: polyvinylidine fluoride
PP: polypropylene

Table 8. Closure Actions and Estimated Durations for Transuranic RLW Treatment Units

TRU Category	Closure Duration Estimate [1]	Permit Application No.	Vessel /item description	Room # in 50-001	Other Buildings	Isolate Unit	Collect liquid &/or Solids Sample for Analysis Sample	Evacuate (Pump or Drain) Free Liquid and/or Solids	Route Removed Liquids/Solids to New RLWTF for Treatment	Decontaminate Unit (Wash, scabble)	Demolish/Remove secondary containment system components	Radiological Survey	Apply Fixative or Paint	Remove Treatment Unit or vessel and Associated Structural Components	Size Reduce/Segment Larger removed Tanks/Vessels if Required	Complete Structural Assessments [1]	Demolish and Remove Structure(s) [1]	Collect Subgrade Soil Sample(s) [1] After Removal of Structure/Unit	Package/Ship Off-Site for Processing (e.g., Solidification) or Disposal Off-Site [1]	Route Drummed Solidified Waste Forms To TA-54 At LANL For Off-Site Transport and Disposal [1]
TRU Collection System		T1	TRU Collection system	NA	TA-50, TA-55, 50-201	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TRU Influent Storage	60 days	T2	Acid Waste Tank	NA	50-066, 50-107	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
		T2	Caustic waste tank	NA	50-066, 50-107	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
		T2	Piping	NA	50-066, 50-107	X	X	X	X	X		X		X		X	X		X	
		T2	Valves	NA	50-066, 50-107	X	X	X	X	X		X		X		X	X		X	
		T3	TK-1	60	NA	X	X	X	X	X	X	X	X	X		X	X	X	X	
		T3	TK-2	60	NA	X	X	X	X	X	X	X	X	X		X	X	X	X	
TRU Treatment	60 days	*Idle*	TK-4	60A	NA	X	X	X	X	X		X		X			X		X	
			TK-6	60A	NA	X	X	X	X	X		X		X		X	X		X	
			TK-73	70A	NA	X	X	X	X	X	X	X		X	X	X	X		X	
		Idle	TK-7	60A	NA	X	X	X	X	X	X	X	X	X		X	X	X	X	
			Pressure Filter	60	NA	X	X	X	X	X		X		X		X	X		X	
		Idle	Decant filter	60A	NA	X	X	X	X	X		X		X		X	X		X	
			Piping	60 & 70A	NA	X	X	X	X	X		X		X	X	X	X		X	
			Drum tumbler	60A	NA	X	X	X		X		X		X	X	X	X		X	X
TRU Solids	30 days	T4	TK-7A	60A	NA	X	X	X	X	X	X	X	X	X		X	X	X	X	
TRU Effluent	30 days	T5	TK-3	60	NA	X	X	X	X	X	X	X		X	X	X	X		X	

[1] The estimated durations shown in the second column do not include the time required for completing the activities listed in the last five columns (covered elsewhere). These durations assume steady, advanced funding for closure.

Table 9: Closure Actions and Estimated Durations for Balance of Plant Systems

Category	Closure Duration Estimate	Feature Description	Typical Components	Actions to be Taken					
				Isolate	Drain/De-energize	Decon	Rad Survey	Remove	Disposal
Processing Support	20 days[1]	Chemical Supply, Compressed Gas	Argon tank and associated piping.		X			X	X
			CO2 tank and associated piping.	X	X			X	X
			P-10 gas rack and associated piping.	X	X			X	X
		Vacuum	Vacuum pumps, piping, gages, etc.	X	X			X	X
		Compressed Air	Compressors, piping, instrumentation, etc.	X	X			X	X
		Chemical Supply	Wet chemical feed, MgSO4, lime, etc.	X	X			X	X
		Chemical Supply Sodium Hydroxide	Caustic chemical supply, CST-1, CST-2, CST-3, etc.	X	X			X	X
		Water, Non-Potable	Process cooling tower, industrial water, laboratory water (DI),	X	X			X	
		Chemistry Labs		X	X	X	X	X	X
Infrastructure	40 days[1]	SCADA System	SCADA components	X	X	X	X	X	X
		Security	Badge readers	X		X	X	X	
		Instrumentation and Control	Servers, PLCs, logix integrators, conduit, instrumentation, etc.	X	X	X	X	X	
		Telecommunications	Telecommunications and computing installations	X			X	X	
		Public Address	PA system	X			X	X	

[1] The duration required to completely remove some systems (e.g., utilities) may extend into, but occur within, the building components and structure demolition and removal phase

Table 9: Closure Actions for Balance of Plant Systems (continued)

Category	Closure Duration Estimate	Feature Description	Typical Components	Actions to be Taken					
				Isolate	Drain/De-energize	Decon	Rad Survey	Remove	Disposal
Infrastructure	40 days[1]	HVAC	Fans, ductwork, filters, housings, manometers, samplers, etc.	X	X	X	X	X	
		HVAC, Contaminated	Fans, ductwork, filters, housings, manometers, samplers, etc.	X	X	X	X	X	X
		Industrial Safety	Safety showers, eye washes, oxygen, CO2 and NG sensors	X	X			X	X
		Radiation Monitoring	CAMs, PCMs, hand/foot monitors, fixed head samplers, etc.	X		X	X	X	
		Fire Protection	Fire Suppression System, Fire Alarm, fire extinguishers, Standpipes	X	X		X	X	
		Lightning Protection	Rods, grounding cables, surge suppression, etc.	X	X		X	X	
Utilities	100 days[1]	Hoists and Cranes	Cranes, rescue tripod, hoists, winches, rigging, mobile equipment, etc.	X	X		X	X	
		Diesel Generators	Diesel generators, fuel system, cooling water, instrumentation, starting battery, distribution panel, circuit breakers, ATS	X	X		X	X	
		Water, Heating	Boilers, piping, radiators, etc.	X	X		X	X	

[1] The duration required to completely remove some systems (e.g., utilities) may extend into, but occur within, the building components and structure demolition and removal phase

Table 9: Closure Actions for Balance of Plant Systems (concluded)

Category	Closure Duration Estimate	Feature Description	Typical Components	Actions to be Taken					
				Isolate	Drain/De-energize	Decon	Rad Survey	Remove	Disposal
Utilities	100 days[1]	Natural Gas	Piping, valves, gauges, etc.	X	X		X	X	
		Water, Potable	Potable water, utility feed, fire water supply	X	X		X	X	
		Sanitary Waste	Piping, sinks, floor drain fixtures, sump pumps	X	X		X	X	
		Elevator	Elevator and dumbwaiter, lifting cage, doors, hydraulic pump, motor, cable, lifting ram, controls, etc.	X	X		X	X	
		Lighting	Fixtures, conduit, bulbs, emergency lighting, etc.	X	X		X	X	
		Electrical Power	MCCs, transformers, switchgear, breakers, etc.	X	X		X	X	
Building Components and Structures (Demolition/ Removal)	300 days	Offices		X		X	X		X
		Non-Rad Storage		X		X	X		X
		Building Structures	Walls, floors, roof, doors, ceilings, structure, perimeter fence, etc.				X	X	X
Stormwater	15 days	Storm Sewer	Piping, manholes, French drains	X				X	X
		Water, Storm	Gutters and downspouts, roof drains and piping	X				X	X

[1] The duration required to completely remove some systems (e.g., utilities) may extend into, but occur within, the building components and structure demolition and removal phase.

Table 10. Potential Waste Material Types Generated and Disposal Options

Potential Waste Materials	Waste Types	Disposal or Treatment Options
PPE	Solid waste Low-level radioactive solid waste	Subtitle D landfill LLRW disposal facility (DOE Nevada, and/or commercial)
Decontamination wash water	Non-regulated liquid waste Radioactive liquid waste	Sanitary sewer On-site replacement RLWTF or licensed facility LLRW treatment and disposal
LL RLW and TRU RLW liquids and solid materials removed from RLWTF treatment units	Radioactive liquid waste TRU waste	On-site replacement RLWTF or licensed facility LLRW treatment and disposal Facility licensed to treat TRU waste and after stabilization WIPP
Tanks, vessels, piping, and other ancillary components and equipment removed from the RLWTF during final closure activities	TRU waste Low-level radioactive solid waste	WIPP LLRW disposal facility (DOE Nevada, and/or commercial)
Discarded waste management equipment	Solid waste Low-level radioactive solid waste	Subtitle D landfill LLRW disposal facility (DOE Nevada, and/or commercial)
Sampling equipment	Solid waste Low-level radioactive solid waste	Subtitle D landfill LLRW disposal facility (DOE Nevada, and/or commercial)
Non-radiological Storage structures	Solid waste	Re-use, recycle, or Subtitle D landfill
Asphalt and concrete demolition debris	Solid waste	Recycle or Subtitle D landfill

APPENDIX B
FIGURES

Figure 1. Aerial View Radioactive Liquid Waste Treatment Facility

Figure 2. RLWTF Location and Treatment Units

Figure 3. Example of Low-Level Radioactive Liquid Waste Collection System Piping and Valve Station

Figure 4. Integrated RLWTF Closure Schedule

Figure 1. Aerial View Radioactive Liquid Waste Treatment Facility

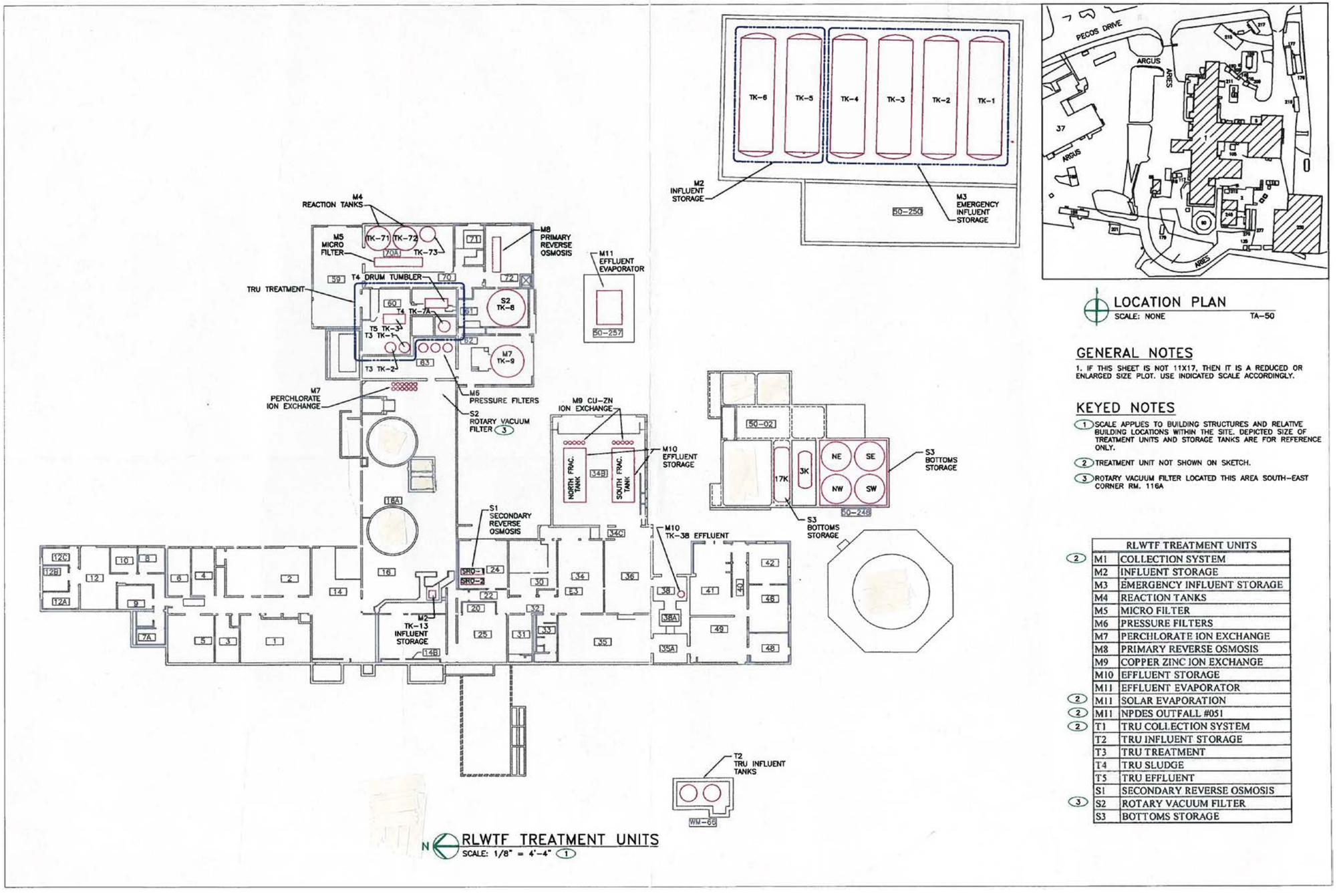


Figure 2. RLWTF Location and Treatment Units

Figure 3. Example of Low-Level Radioactive Liquid Waste Collection System Piping and Valve Station

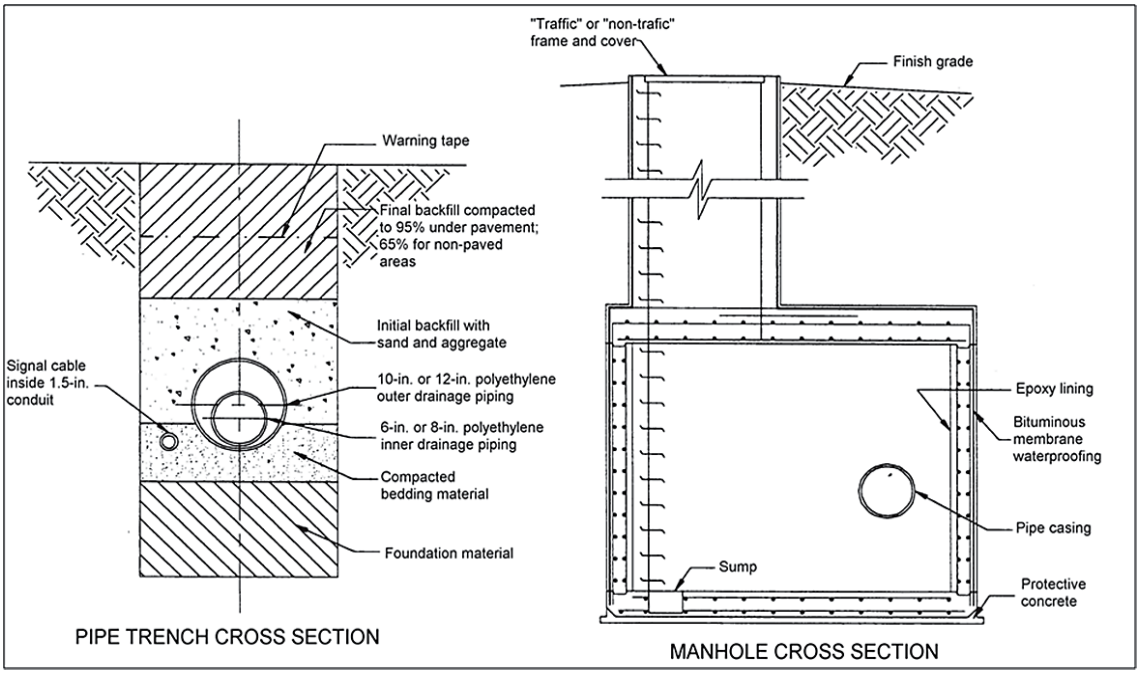
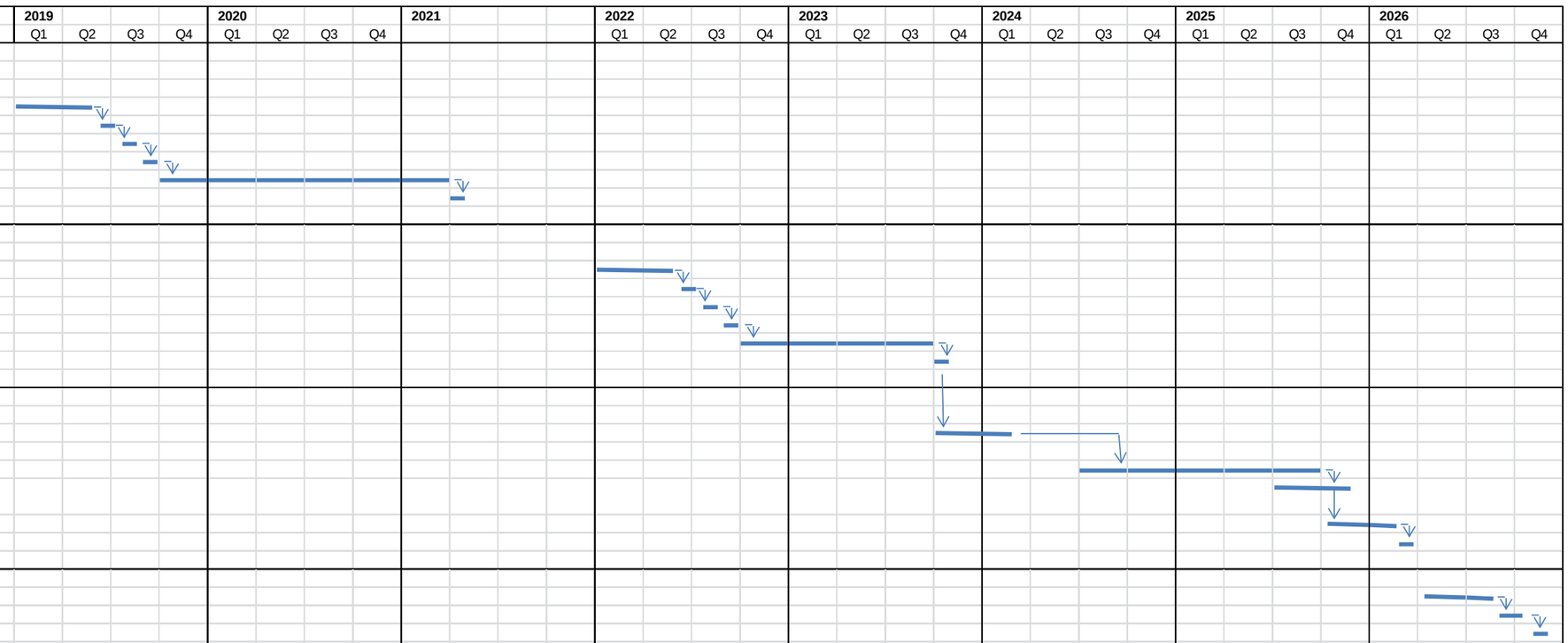


Figure 4. Integrated RLWTF Closure Schedule

ID		Task Name	Duration (days)
		Stabilization - Low level RLW	**661**
1		Cessation of operations	1
2		Submit Stabilization Plan to NMED	120
3		NMED review and comment	30
4		Submit revised Stabilization Plan to NMED	30
5		NMED approval of Stabilization Plan	30
6		Stabilization	420
7		Submit Stabilization Report to NMED	30
		Stabilization - Transuranic RLW	**481**
8		Cessation of operations	1
9		Submit Stabilization Plan to NMED	120
10		NMED review and comment	30
11		Submit revised Stabilization Plan to NMED	30
12		NMED approval of Stabilization Plan	30
13		Stabilization	240
14		Submit Stabilization Report to NMED	30
		Closure Activities	**602**
15	*	Cessation of operations	1
16	*	Submit revised Closure Plan to NMED	120
17	*	NMED determines closure start date	1
18	*	Demolish and remove buildings	300
19	*	Size reduction, sample, package, manifest, and ship waste materials	90
20	*	Verify sampling in solis	60
21	*	Site restoration activities	30
		Reporting	**180**
22	*	Submit draft Closure Report to NMED	90
23	*	NMED review and comment	60
24	*	Submit revised Closure Report to NMED	30



* In accordance with Condition 46 of the Groundwater Permit, the investigation, characterization, and cleanup of existing and future SWMUs and AOCs shall be conducted solely under the NMED Consent Order of June 2016 and not under the Ground Water Permit. Through the Consent Order, the NMED establishes priorities for investigation, characterization, and cleanup of SWMUs and AOCs across LANL. Therefore, actual start date for closure of the RLWTF will be dependent upon the Consent Order process, and may differ from the start date indicated in this schedule.